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A CASE OF HÆMORRHAGIC NEPHRITIS IN A NEWBORN BABY

BY

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Cases of hæmorrhagic nephritis are fairly frequent in young children, but they are not common in very early infancy. Aldrich[1] records 186 cases of all ages, and groups nephritis under several headings, putting acute post-infectious hæmorrhagic nephritis as occurring in 129 instances. Copeman[4] records cases in children aged eleven and fourteen years. Hanssen[7] recorded two cases in young children about four years old.

Griffiths and Mitchell[5] give many references to acute nephritis in the new-born including a case of true congenital or fœtal nephritis described by Widakoivich and Dutrey[13]. They also quote Mensi's[10] report on 17 cases seen in infants from ten to forty days old. Weisswanger and Rietschel[12] give details of the findings when the new-born child of an eclamptic mother developed a severe hæmorrhagic nephritis which lasted some six days.

The following case is judged worthy of being placed on record because of the onset at a very early age, the lack of evidence of any causal agent, and the clinical and pathological records that are available.

Case report.

Infant, P. W., male, aged 11 days. Sent to St. Mary's Hospital, April 9th, 1927.

HISTORY (Dr. Chas. Wilcocks).—Pregnancy was uneventful. The mother's urine was examined several times and contained no albumen. Forceps delivery, placenta adherent. The mother had no drugs except cascara and liquid paraffin. The baby was well for a day or two then became restless and distressed and passed blood in the urine, and the kidneys could be palpated more easily than usual. Very little urine had been passed since birth and the stools though infrequent were dark and slimy. The temperature was not raised. The baby would not take breast milk and only took small quantities of milk and water.

CONDITION ON EXAMINATION.—The baby seems to be in pain. The buttocks are inflamed and there is a rash on the flexor surface of the elbows and on the shoulders. Palpation of the abdomen revealed a swelling the size of a tangerine orange in the left renal region. Mr. Morley examined the case and confirmed the palpable enlargement of the kidney.

April 10th. By catheter about 20 drops of blood-stained urine were obtained.

April 11th. Baby was worse, respirations gasping, no rise in temperature. Stools frequent, dark brownish green. Thirty drops of blood-stained urine by catheter.

April 13th. Convulsions and death.

PATHOLOGIST'S REPORT (Dr. Annie E. Somerford).—The measurements of the right kidney were—length 4·75 cm.; breadth 3·2 cm.; thickness 3·0 cm. Of the left kidney the corresponding measurements were—4·75 cm.; 3·0 cm.; 2·2 cm.

The capsule in each case was glossy, thin and non-adherent to the kidney substance. Each kidney showed extensive irregular mottling of a deep reddish purple colour, the right side being more affected.

On section it was found that the mottling seen on the surface was continued through the kidney substance. Hence the cut surface showed areas of pale, apparently normal, renal tissue alternating with deep purple areas. The contrast between the cortex and medulla was poorly marked (Fig. 1).

FIG. 1.—Hæmorrhagic nephritis. The dark areas are those in which hæmorrhage has taken place. These can be seen on the external surface of the kidney as well as on the cut surface.

The pelvis in each case did not present any abnormality. Under the microscope widespread hæmorrhage was seen involving both cortex and medulla, but being entirely confined to the interstitial tissues. The microphotograph (Fig. 2) shows the appearances of the kidney tissues outside the hæmorrhagic areas. There was marked necrosis of the cells of the tubules, and these cells had been shed into the lumina of the tubules in large numbers.

There was no evidence of congenital cystic kidney.

Discussion.

Cases of acute hæmorrhagic nephritis in new-born babies are not common. Jacobi[9] emphasizes the intestinal and toxic origin of these cases.

Such an explanation seems to be much the most likely after the infant has had time to develop a bowel disturbance or an infection. The case recorded, however, occurred at a very early age and enquiry revealed nothing which indicated that the mother might have had a chemical poisoning which could have affected the infant's kidneys, nor was it likely that the infant had had any treatment or infection which might have caused such a severe nephritis in the first few days of life.

Cassell[3] quotes syphilis as a cause of nephritis in the new-born. Paterson and Wyllie[11] mention babies of four and six months who had had albuminuria. My case does not appear to have been syphilitic.

There has been a good deal of literature recently on acute hæmorrhagic nephritis in children. Ball and Evans[2] emphasize the frequency of streptococcal infections and say that such infections may occur from the tonsils or from the skin or from the digestive tract. Wyllie and Moncrieff[14] say that the disease is due to a streptococcal infection from focal sepsis elsewhere and probably is in the nature of a streptococcal embolism. It is just possible that acute nephritis in a new-born infant might be due to a septic focus in the mother, but the fœtus is usually so well protected that this origin is unlikely.

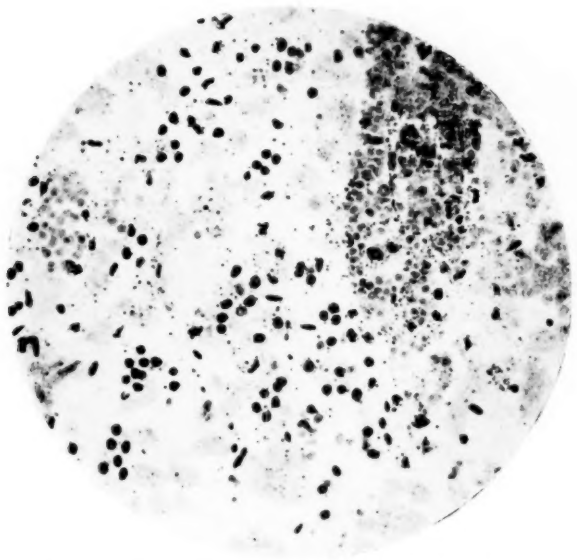

FIG. 2.—This section does not show hæmorrhage but shows almost complete disintegration of the tubules, leaving only the nuclei and their debris visible. Other sections of hæmorrhagic areas seen in the photograph showed typical appearances.

Hurst[8] gives instances of hereditary familial congenital hæmorrhagic nephritis, and Guthrie[6] records cases. In such cases, however, there is a marked family history going through several generations and the condition is probably one of hematuria rather than of nephritis, and it may be an allergic condition. In one of Hurst's cases abnormal urine was discovered when the patient was only three weeks old.

It is interesting to note that the kidney swelling could be clearly palpated. It has been my experience in another case of acute nephritis in a young infant, to be able to palpate both kidneys as globular swellings about the size of a tangerine orange. In the early stage of an acute infection the kidneys are likely to be distended.

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EXPERIMENTAL STUDY OF THE ANTIRACHITIC FACTOR IN HUMAN AND ANIMAL MILKS

BY

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and

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Rickets is a manifestation of disturbed nutrition, and as such must be intimately connected ætiologically with the diet of the child. This relationship between the diet and the disease has been the subject of many investigations since Mellanby[1], in 1919, produced rickets in puppies by a deficient diet.

Milk, being the basic diet of every infant, was naturally the subject of many of these investigations. The anti-rachitic power of the various milks was a special point of interest. Practically all writers on this subject agree in considering human milk to be clinically a more powerful anti-rachitic agent than cow's and other animal milks used in infant feeding. Thus, Hess and Weinstock[2] showed that, in New York during the month of March, approximately all bottle-fed infants showed evidence of rickets, while only one-third to one-half of the breast-fed infants manifested signs of that disease.

In Egypt, where artificial feeding has not yet gained a strong foothold, and where natural feeding still predominates, rickets is a fairly common complaint among infants. Thus in Cairo, where more than 80 per cent. of infants are purely breast-fed, Shawki[3] demonstrated that rickets affects practically 50 per cent. of infants between the ages of six months and two years. From the experimental point of view, however, the superiority of human milk over cow's milk as regards its vitamin-D content is not so definite. All workers consider both human and cow's milk to be poor in their vitamin-D content. Marriot[4] states that there is on the average as much vitamin D in cow's milk as in human milk but none too much for the needs of the infant in either. Marfan[5] states that human milk contains little or no anti-rachitic factor, while cow's milk contains a little more of this factor.

Hess and Weinstock[2] attribute this superiority in anti-rachitic power of human milk to the favourable equilibrium of the various ions that human milk contains, resulting in conditions which greatly further the absorption and the retention of calcium and phosphorus, and not to a higher content in human milk of the anti-rachitic factor.

Present investigations.

Since the beginning of 1931, we have been experimenting on the relation of milk to the ætiology of rickets, using for the purpose albino rats. These were chosen of an average age of four weeks and weight of 40 grm. from a stock bred in our laboratories for these experiments. The rachitogenic diet used is the Steenbock and Black diet No. 2,965, made up of yellow maize 76 per cent., gluten 20 per cent., calcium carbonate 3 per cent., and sodium chloride 1 per cent.

In most of our experiments, we used the preventive method. The rats were fed on the above rachitogenic diet plus the substance to be tested for a period of about four weeks, being kept all the time in a dark room. At the end of that period, the left knee-joints were radiographed, the animals killed and sections made from their joints examined microscopically. Phosphorus and calcium of the pooled blood of each group were also estimated in most of the experiments. Throughout every experiment, the rats were regularly weighed and their growth curves noted. Any rats that lost or did not gain weight properly were discarded. In reading the radiograms, the distance between the epiphysis and the diaphysis was measured in millimeters; a distance of less than 1 mm. was considered as slight rickets, between 1 and 2 mm. as moderate, and above 2 mm. as marked rickets.

Experiments with whole milk.—An important point which should always be kept in mind in all experimental studies of rickets on rats is that these animals react towards the content of calcium and phosphorus in the diet differently from the human infant. Rats can absorb and assimilate these salts when given in appreciable quantities in their diet without any need for vitamin D, while infants cannot do so unless the anti-rachitic factor is supplied as well[2].

This fact is well exemplified in our first experiment (Table 1). In this experiment we found that human milk given to albino rats in per capita doses of 20 c.cm. had no effect in preventing rickets; while buffalo's milk (the milk commonly consumed in Egypt) in 10 c.cm. doses could definitely prevent the disease. In addition we could show, in the same experiment, that the mere addition of phosphates to the above tested rachitogenic diet could entirely prevent the development of rickets. The fat content in the amounts of milks given is equal, but the salt content of buffalo's milk is about five to six times that of human milk. Buffalo's milk contains an average of 7·5 per cent. fat and 0·75 per cent. salts.

The capacity of rats to absorb and utilize calcium and phosphorus salts without any accessory factor explains the stronger anti-rachitic power of buffalo's milk to rats.

Hess and Weinstock[2], although using cow's milk and a different rachitogenic diet (No. 84 Sherman and Peppenheimer), came to conclusions very similar to our own. They required 20 c.cm. cow's milk to prevent

rickets. Thus the difficulty of experimenting on rats with whole milk is quite evident. Yet, in spite of this difficulty, rats remain the best standard test animals we possess for assaying the potency of anti-rachitic substances. Various attempts have been made to overcome this salt factor. Outhouse, Macy and Brekke[6] tried to eliminate this salt factor in experimental rickets by keeping the ratio Ca/P constantly at 5 to 1 in all diets used; a ratio

TABLE 1.

COMPARATIVE ANTI-RACHITIC VALUE OF HUMAN AND OF BUFFALO'S MILK.

Rats.	Diet (4 weeks).	Rickets.	
		X-rays.	Microscope.
Group A. 1	Rachitogenic only	Marked	Marked
2		,,	,,
3		,,	,,
4		,,	,,
Group B. 1	Rachitogenic with 10 c.cm. human milk	,,	,,
2		,,	,,
3		,,	,,
4		,,	,,
Group C. 1	Rachitogenic with 20 c.cm. human milk	Marked	Marked
2		Moderate	Moderate
3		,,	,,
4		,,	,,
Group D. 1	Rachitogenic with 10 c.cm. buffalo's milk	Absent	Absent
2		,,	,,
3		,,	,,
4		,,	,,
Group E. 1	Rachitogenic with $CaPO_4$ (0·3 grm.)	,,	,,
2		,,	,,
3		,,	,,
4		,,	,,

which, according to them, is essential in any diet for the production of rickets. They found that human milk in quantities as large as 40 c.cm. daily was ineffective in curing rats from rickets, while 30 c.cm. of cow's milk daily brought about considerable healing. Hess and Weinstock used centrifugalized cow's cream (20 per cent. fat) which contains only a trace of phosphorus, and found that 8 c.cm. were needed to afford complete protection against rickets. Lesné and Vagliano[7] using an ethereal extract of mother's

TABLE 2.

ANTI-RACHITIC VALUE OF FAT IN HUMAN, COW'S AND BUFFALO'S MILK.

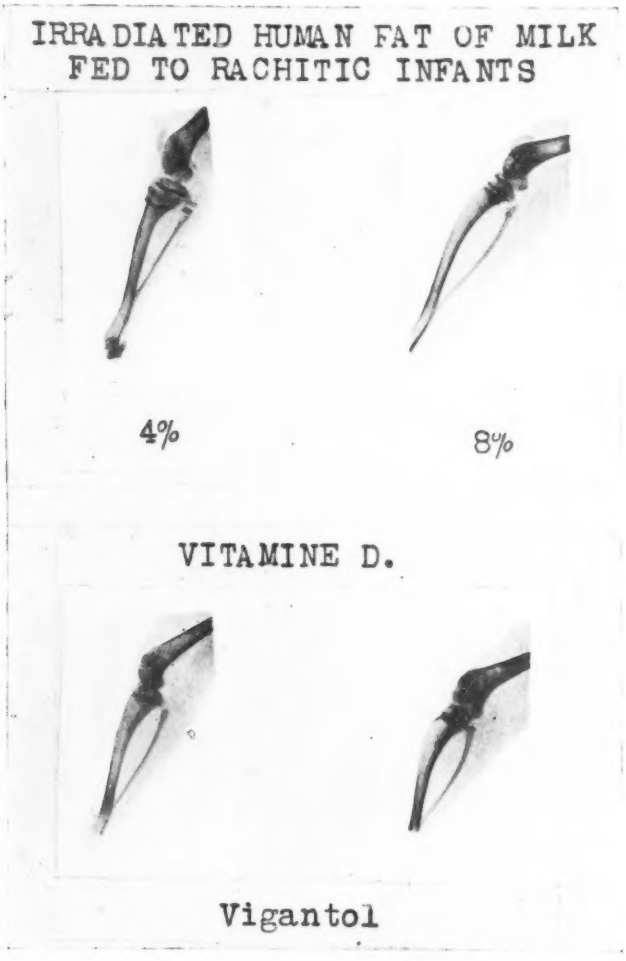
Rats.	Diet (4 weeks).	Rickets.		Pooled blood phosphorus.
		X-rays.	Microscope.	
Group A. 1	Rachitogenic only	Marked	Marked	2·6 mgrm. %
2		,,	,,	
3		Moderate	Moderate	
4		,,	,,	
5		,,	,,	
6		,,	,,	
Group B. 1	Rachitogenic with 4% cow's milk fat	Moderate	Moderate	2·1 ,,
2		Marked	Marked	
3		Moderate	Moderate	
4		,,	,,	
5		,,	,,	
6		Marked	Marked	
Group C. 1	Rachitogenic with 8% cow's milk fat	Moderate	Moderate	2·2 ,,
2		,,	,,	
3		Marked	Marked	
4		Moderate	Moderate	
5		Marked	Marked	
6		—	—	
Group D. 1	Rachitogenic with 12% cow's milk fat	Marked	Marked	2·2 ,,
2		Moderate	Moderate	
3		,,	,,	
4		Marked	Marked	
5		Moderate	Moderate	
6		,,	,,	
Group E. 1	Rachitogenic with 4% human milk fat	Moderate	Moderate	2·7 ,,
2		Moderate	Moderate	
3		Moderate	Moderate	
4		Marked	Marked	
5		Moderate	Moderate	
6		Marked	Moderate	

TABLE 2—(*contd.*).

Rats.	Diet (4 weeks).	Rickets.		Pooled blood phosphorus.
		X-rays.	Microscope.	
Group F. 1	Rachitogenic with 8% human milk fat	Marked	Marked	3·0 mgrm. %
2		Moderate	Moderate	
3		Marked	Marked	
4		,,	,,	
5		,,	,,	
6		Moderate	Moderate	
Group G. 1	Rachitogenic with 12% human milk fat	Marked	Marked	3·6 ,,
2		Moderate	Moderate	
3		,,	,,	
4		Marked	Marked	
5		Moderate	Moderate	
6		,,	,,	
Group H. 1	Rachitogenic with 4% buffalo's milk fat	Moderate	Moderate	2·3 ,,
2		Marked	Marked	
3		,,	,,	
4		,,	,,	
5		,,	,,	
6		Moderate	Moderate	
Group I. 1	Rachitogenic with 8% buffalo's milk fat	Moderate	Moderate	2·0 ,,
2		Marked	Marked	
3		,,	,,	
4		,,	,,	
5		Moderate	Moderate	
6		—	—	
Group J. 1	Rachitogenic with 12% buffalo's milk fat	Marked	Marked	2·2 ,,
2		Moderate	Moderate	
3		Marked	Marked	
4		,,	,,	
5		Moderate	Moderate	
6		Marked	Marked	
Group K. 1	Rachitogenic with Vitamin D (2 drops of vigantol)	No	No	7·0 ,,
2		No	No	
3		No	No	
4		No	No	

milk could not cure rickets in percentages up to 5 per cent. Kennedy and Palmer[8], experimenting with human milk fat, concluded that human milk fat could not cure rickets at a minimum level of 8 per cent. MacCollum and others[9] showed that it is necessary to feed 15 to 30 per cent. of cow's butter fat to rats in order to bring about even a faint calcification of bones.

Experiments with milk fat.—In the following experiments we aimed at excluding the salt factor. We made butter from human milk of 80 wet nurses feeding healthy infants of the Foundling Home of Qasr el Aini Hospital and



from buffalo's milk supplied to that hospital. Cow's milk butter was bought ready made from a reliable dairy. The butter obtained was heated in hot water baths kept constantly at 40° C. till it changed to an oily consistency and all the remains of milk together with water and salts gravitated down. The fat obtained in this way was mixed with the Steenbock and Black rachitogenic diet (No. 2965) in increasing percentages. It was found that the addition of human, cow's and buffalo's milk fat to the rachitogenic diet

in percentages up to 12 per cent. had no effect in preventing rickets. Addition of vitamin D in minute doses (2 drops of Vigantol) could completely prevent the development of rickets (Table 2).

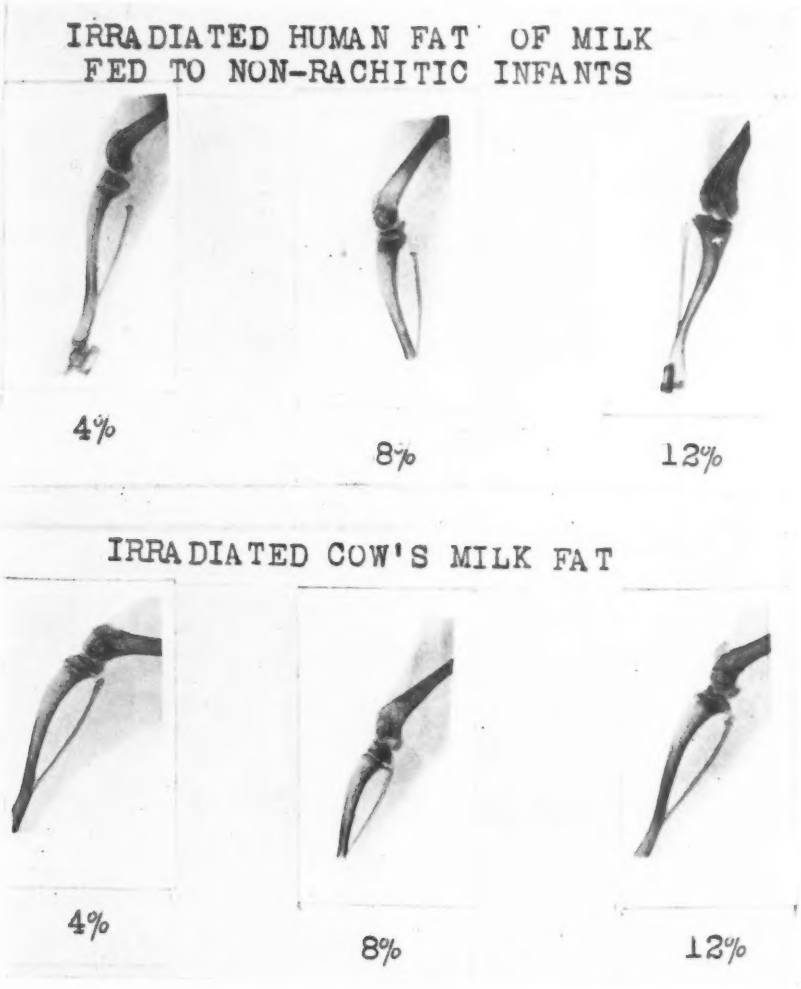
It thus becomes clear that vitamin D cannot be present in human, cow's or buffalo's milk fat in amounts of any value to prevent the development of rickets in rats.

TABLE 3.

ANTI-RACHITIC VALUE OF IRRADIATED MILK FAT.

Rats.	Diet (4 weeks).		Rickets.		Pooled blood phosphorus.
			X-rays.	Microscope.	
Group A. 1	Rachitogenic with 4% irradiated human milk fat	of mothers nursing non-rachitic infants	Slight	Slight	4·5 mgrm. %
2			No	No	
Group B. 1	Rachitogenic with 8% irradiated human milk fat		,,	,,	5·2 ,,
2			,,	,,	
Group C. 1	Rachitogenic with 12% irradiated human milk fat		,,	,,	4·6 ,,
2			—	—	
Group D. 1	Rachitogenic with 4% irradiated human milk fat	of mothers nursing rachitic infants	Moderate	Moderate	4·3 ,,
2			Moderate	Moderate	
Group E. 1	Rachitogenic with 8% irradiated human milk fat		Slight	Slight	4·6 ,,
2			,,	,,	
Group F. 1	Rachitogenic with 4% irradiated cow's milk fat		No	No	4·8 ,,
2			,,	,,	
Group G. 1	Rachitogenic with 8% irradiated cow's milk fat		,,	,,	—
2			,,	,,	
Group H. 1	Rachitogenic with 12% irradiated cow's milk fat		,,	,,	4·5 ,,
2			,,	,,	
Group I. 1	Rachitogenic with Vitamin D (Vigantol 2 drops)		,,	,,	4·8 ,,
2			,,	,,	

Experiments with irradiated milk fat.—Although it is proved that milk, whatever its source, is poor in its vitamin-D content, it has been shown that irradiation of milk enhances its anti-rachitic power. Halac and Nassu[10] have shown that a high anti-rachitic value is imparted to raw milk by a brief period of irradiation. Kramer[11], Mackay and Shaw[12], and György[13] claimed to cure rickets in infants by irradiated milk. Supplee and Dow[14] experimenting on rats with irradiated dry milk came to similar conclusions.



We obtained fat from the milk of a group of healthy women feeding healthy non-rachitic infants of an average age 6 to 12 months, and fat from the milk of another similar group of women nursing definitely rachitic infants of the same average age as the first group. In both groups, the infants were purely breast-fed, and were not, nor had been, suffering from gastro-intestinal disturbance or infection of any note. The fat obtained in this way together with fat of cow's milk was irradiated by ultra-violet rays, then mixed with the rachitogenic diet in increasing percentages.

The method of irradiation was to expose a layer of fat about 2 mm. in depth at a distance of 30 cm. from source of light for a period of 30 minutes.

It was found that irradiation of milk fat enhances markedly its anti-rachitic action. Thus while the addition of 12 per cent. non-irradiated fat to the rachitogenic diet could not prevent the development of rickets (see Table 2), addition of 4 per cent. irradiated milk fat could prevent the disease (Table 3).

Another interesting finding was that human milk fat of mothers nursing rachitic infants, even after irradiation, proved to be inferior in its anti-rachitic power to that of mothers feeding healthy non-rachitic infants.

Summary of results.

We may summarize the main results obtained from the above experiments as follows:—

(1) Human milk, cow's milk and buffalo's milk do not contain fully formed vitamin D in amounts of any practical value in the prevention of rickets.

(2) The above milks contain a precursor of vitamin D (a provitamin) which on activation will be converted into vitamin D in amounts sufficient to prevent the development of rickets.

(3) Human milk of mothers feeding rachitic children is poorer in its content of this precursor of vitamin D than that of mothers nursing healthy non-rachitic children.

(4) There is no significant difference between human and cow's milk as regards their vitamin-D or provitamin content.

Comment.

The results of our experiments agree with those of most other workers in that milk, whatever its source, does not contain vitamin D in sufficient amounts to be of practical value in the prevention of rickets.

In addition, it has been shown by various workers that irradiation of milk endows it with anti-rachitic power. We came to a similar conclusion on irradiating milk fat itself. Thus, the child is evidently receiving in his milk supply sufficient amounts of the precursor of vitamin D (or provitamin) which will acquire anti-rachitic properties when irradiated by exposure of the child to sunlight or ultra-violet rays.

It has been shown also that rachitic children are probably receiving a smaller amount of provitamin in their milk supply.

The clinical difference between human and cow's milk in their anti-rachitic power which has been stated by various authors cannot be due to any difference in their vitamin-D or provitamin content, as both are present in nearly the same amounts in both milks. It must be ascribed to other factors.

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THE POSITION OF THE LARGE INTESTINE IN INFANTS AND ITS RELATION TO CONSTIPATION

BY

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The work presented in this paper was undertaken, first, to ascertain the differences in shape and position of the large intestine in infants, especially of the iliac and sigmoid colons; and, secondly, to see if there is any real relation between any of these types and constipation in infants.

Anatomy.—A short account of the anatomical characters of the descending colon, iliac and sigmoid portions of the large intestine in adults will help much to the appreciation of the differences we came across in these portions of the large intestine in infants.

The descending colon passes downwards through the left hypochondriac and lumbar regions and in front of the lower part of the left kidney. At the lower end of the kidney, it turns medially towards the lateral border of the psoas major, and descends in the angle between the psoas major and quadratus lumborum muscles to the crest of the ilium; it then curves downwards and medially in front of the iliacus and psoas major, and ends in the sigmoid colon at the superior aperture of the lesser pelvis.

That portion of the descending colon which extends from the ilium to the superior aperture of the lesser pelvis is sometimes named the iliac colon.

The sigmoid colon, sometimes called the pelvic colon, begins at the superior aperture of the lesser pelvis where it is continuous with the descending colon; it forms a loop which averages about 20 cm. in length and normally lies within the pelvis. The loop consists of three parts. The first part descends in contact with the left pelvic wall; the second crosses the pelvic cavity between the rectum and bladder in the male, and the rectum and uterus in the female, and may come in contact with the right pelvic wall; the third arches backwards and reaches the mid-line at the level of the third piece of the sacrum where it bends downwards and ends in the rectum.

The position and shape of the sigmoid colon vary very much and depend on:—

(1) Its length.

(2) The length and freedom of its mesocolon.

(3) The condition of distension: when distended it rises out of the pelvis into the abdominal cavity, and when empty it sinks again into the pelvis.

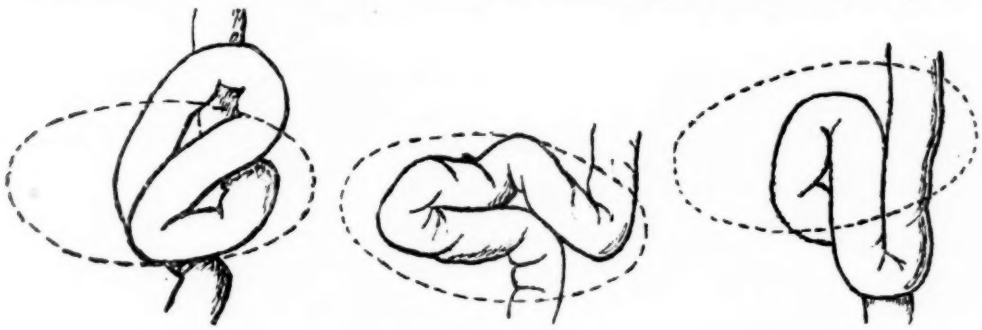
(4) The condition of the rectum and bladder: when these organs are distended, the sigmoid colon tends to rise, and conversely (see Fig. 1).

In infants, conditions are entirely different. The descending colon is comparatively short, and is in contact with the left kidney and quadratus

FIG. 1.—X-ray picture of the large intestine in an adult after a barium enema.

lumborum muscle. The sigmoid colon is the most striking part of the large intestine in the newly-born. It is generally enormously distended with meconium, and as the lesser pelvic cavity is too small to contain any considerable part of it, it projects far upwards into the abdomen. The sigmoid colon may take a variety of forms for which several classifications have been suggested. Following that proposed by Bourcart, three main types can be recognized, the ascendant, the transverse and the descendant. The ascendant is by far the commonest, being found in 75 per cent. (Gysi) to 80 per cent. (Bourcart) of all cases. In this type, three intestinal loops are

formed. The first is small with its apex directed downwards and lies in the left iliac fossa, and passes over into the main loop which is directed upwards into the abdominal cavity and which may reach the level of the umbilicus or even higher. The descending limb of the main loop joins the small third loop which passes into the lesser pelvis. In the second type, the main loop of the sigmoid passes transversely across the lower part of the abdomen and its apex is lodged in the right iliac fossa. Twenty to twenty-five per cent. of sigmoid flexures are of this variety. In the third type which is quite unusual, the sigmoid passes directly over the left iliac fossa into the lesser pelvis. The main loop of the sigmoid colon is almost always in front of the small intestine and in contact with the anterior abdominal wall. In one half of all cases, a part of the sigmoid colon lies in the right iliac fossa (see Fig. 2).



Ascendant type. Transverse type. Descendant type.

FIG. 2.—The three main types of large intestine in infants diagramatically after Bourcart.

The explanation of the preceding difference between the large intestine of infants and adults is found in the following words by Jacobi:—

1. The small intestine of the fœtus of 8 months is twelve times as long as its trunk. In the adult it is 8 to 1.
2. The colon of a fœtus at full term is $2\frac{2}{3}$ times that of the trunk. In the adult it is 2 to 1.

The ascending and transverse colons are very short in the fœtus and newly-born. Thus, the descending colon which makes up the difference is longer in proportion, and while the whole intestinal tract grows but slowly in the young fœtus, it increases rapidly in the mature fœtus, but its rate of growth diminishes in proportion sometimes after birth. Meanwhile, the fœtus grows but slowly in the later period of uterine gestation, and the long colon descends with the sigmoid flexure but finds no space for comfortable accommodation. Consequently, the long colon is crowded downwards in the narrow abdomen by the large liver into a narrow pelvis causing many curvatures instead of one sigmoid flexure. Thus it happens that instead of the sigmoid flexure being found to the left or in the median line, it is frequently found in the right side.

The preceding types of the large intestine in infants described by Bourcart have been confirmed by Bednar and Jacobi who were the first to use it for the explanation of congenital constipation in infants.

Present investigations.—Ninety-six normal and healthy children have been examined with the idea of determining the shape and position of their large intestine. The ages of these children lie between one month and three

years. Of these, 62 were in the first year, 25 between 1 and 2 years, and 9 above 2 years. Thirty-nine were females and 57 were males.

The method employed was to give a rectal enema of plain water one hour before the baby was screened. While under the screen, a 3 per cent. suspension of barium sulphate in water containing some white of egg, was introduced by means of a medium-sized glass nozzle attached through an india-rubber tube to a funnel which was held not more than 60 cm. high, and enough was allowed to flow till the splenic flexure was reached. The course of the enema was noticed. The colon was drawn, the iliac crests, umbilicus and nozzle were marked on the screen, and then all are copied on a tracing paper from the screen.

In this way, all the foundlings looked after in the Children's Section of the Qasr el Aini Hospital have been examined.

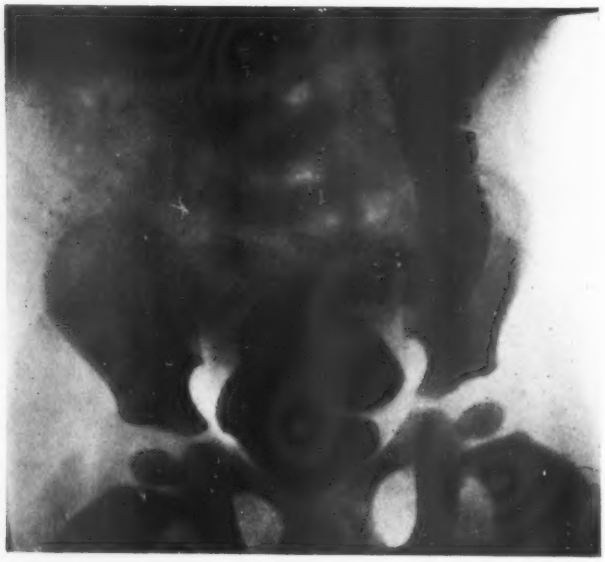


FIG. 3.—Case No. 1: showing the smooth adult type of large intestine in infants.

As this investigation was intended to demonstrate if there is any real relation between the occurrence of kinks in the course of the sigmoid colon and constipation in children, it was decided to classify the types seen into two main groups:—

1. The smooth type, which resembles very much the adult large intestine. The descending colon reaches the left iliac crest, sweeps across the left iliac fossa to the lesser pelvis, and joins the rectum without the slightest kinking (see Fig. 3).

We have found no reference to this type in the literature examined.

2. The kinked type, where the iliac and sigmoid colons, being too long and unable to lie in the lesser pelvis, are thrown up into the abdominal cavity and thus kinked.

Of these two main types there are few sub-types:—

The only sub-type of the first is what we have called the high smooth type, where the descending colon before reaching the iliac crest turns slightly towards the middle line and drops into the lesser pelvis without lying in the left iliac fossa (see Fig. 4).

Of the second main type, there are three sub-types:—

(a) The ascendant, which corresponds exactly to the same described by Bourcart (see Fig. 5).

(b) The transverse, which corresponds with the same transverse type of Bourcart (see Fig. 6).

(c) The oblique, which is a combination of the above two sub-types (see Fig. 7).

We have not come across a case of the descendant type of Bourcart in which the sigmoid descends into the true pelvis and then ascends into the abdomen again before it descends to join the rectum. This can rarely, if ever, exist because of the comparatively small size of the lesser pelvis in infants.

Table 1 summarizes the above classification and gives the percentage of every type:—

TABLE 1.

FREQUENCY OF DIFFERENT TYPES OF LARGE INTESTINE IN INFANTS.

Types.	Below 1 year.		1-2 years.		2-3 years.		Total.	
	No.	per cent.	No.	per cent.	No.	per cent.	No.	per cent.
1. Smooth type:								
a. Ordinary	2	3·23	1	4·00	1	11·11	4	4·17
b. High	6	9·68	2	8·00	0	0·00	8	8·33
Total	8	12·91	3	12·00	1	11·11	12	12·50
2. Kinked type:								
a. Ascendant	32	51·61	9	36·00	2	22·22	43	44·79
b. Transverse	10	16·13	7	28·00	3	33·33	20	20·83
c. Oblique	12	19·35	6	24·00	3	33·33	21	21·85
Total	54	87·09	22	88·00	8	88·88	84	87·50

FIG. 4.—Showing the high smooth type.

FIG. 5.—Case No. 4: showing the ascendant type
Age: 2 years, 4½ months. Weight: 11·050 kgrm.
Stools: 4-5 daily.

FIG. 6.—Case No. 87: showing the transverse type Age: 5 months and 22 days. Weight: 5·5 kgrm. Stools: 3 times daily.

FIG. 7.—Case No. 90: showing oblique type. Age: 2 months and 3 days. Weight: 2 kgrm. Stools: 4-5 daily.

The possible relation between kinked large intestine and constipation.—The above 96 cases were examined once weekly from the time they were admitted to Qasr el Aini Hospital as foundlings until the time of the present investigation. The number of their stools is always recorded in their weekly reports, and on looking up these records, no case was constipated. Our standard for constipation is less than two stools in the 24 hours in the first year of life, and less than one stool in the 24 hours after this year.

The percentage of the kinked type of the large intestine in our series is 87·5 per cent., and that of constipation is nil. Thus we submit that there is no evidence showing any relationship between constipation and the shape of the sigmoid colon and the number of the bends in its course.

We have even come across cases with real twisting that show no constipation.

Constipation in Egyptian infants.—The percentage of constipation in the Egyptian infants seems to be low. From the records of the babies belonging to the Child Welfare Centre of Qasr el Aini Hospital, where the babies are inspected once weekly and where a record of their weight, general health, number and character of their stools are recorded, we found that out of 242 babies aged between 1 and 6 months, 13 (5·4 per cent.) were constipated, and amongst 141 babies aged between 6 and 12 months, 5 (3·5 per cent.) were constipated, and amongst 377 babies aged between 1 and 3 years, 3 (0·9 per cent.) were constipated. Therefore, in the above series of 760 babies below 3 years of age, 21 (2·7 per cent) were constipated. It is to be noted that all the babies belonging to our Child Welfare Centre are breast fed.

We thought it would be interesting to attempt to determine the shape of the large intestine of the above constipated cases. We were able to induce the mothers of eight of the above constipated children to let us carry out our investigations, and there follows the history of these cases and the X-ray reports of the large intestine.

Case 1.—A boy aged 10 months and 15 days, weight 8 kgrm. Stools once daily or every other day. X-ray report: transverse sub-type.

Case 2.—A girl aged 1 year and 15 days, weight 9·5 kgrm. Stools once every three or four days for the first three months. Bowels then got periods of normal defæcation, i.e., 3 daily, and others of mild constipation, i.e., once daily or every other day, but more on the constipated side. X-ray report: Hirschsprung's disease.

Case 3.—A boy aged 2 months and 23 days, weight 4·350 kgrm. Stools once every three or four days, once remained without defæcation for 7 days and on another occasion for 17 days. X-ray report: Hirschsprung's disease.

Case 4.—A boy aged 1 month and 2 days, weight 4·100 kgrm. Baby was normal for the first 15 days of its life defæcating twice daily. Then once daily for some time, then once every two days, at last it was constipated for 7 days. X-ray report: transverse sub-type.

Case 5.—A boy aged 8 months, weight 6 kgrm. Constipated since birth. Stools once every 15 to 20 days. X-ray report: Hirschsprung's disease.

Case 6.—A boy aged 1 year and 4 months, weight 7 kgrm. He was admitted complaining of no defæcation for 4 days. A purge had been given without avail, and an enema without result. There was no vomiting but there was severe distension. History of similar attacks when four months old lasting for 8 days and said to be relieved by medicine. X-ray report: ascendant sub-type with many kinks.

Case 7.—A boy aged 7 months and 10 days, weight 5·250 kgrm. Stools once every four days. X-ray report: ascendant sub-type.

Case 8.—A girl aged 6 months and 9 days, weight not recorded. Stools once daily. X-ray report: smooth type (Fig. 8).

FIG. 8.—Case No. 8: showing smooth type. Girl aged 6 months. Stools: one daily.

Three, therefore, of these eight cases of constipation were cases of true Hirschsprung's disease, an easy explanation of the constipation. Two of the other five cases are of the transverse sub-type, another two are of the ascendant sub-type and the last is of the smooth type. This Case 8 is very interesting indeed, as it shows that smooth large intestine can be constipated just as kinked large intestine can be on the diarrhœa side, and that there is no real connexion between the shape and kinks in the large intestine and constipation.

At the time we were carrying out these investigations, three cases were admitted to the sick children's ward for constipation, and the following is the history of these cases and their X-ray reports.

Case 9.—A boy aged 1 year and 3 months and 29 days, weight 9·300 kgrm. Stools once daily but very hard. X-ray report: Hirschsprung's disease.

Case 10.—A girl 1 year and 1 month, weight 7 kgrm. Stools once daily, on constipated side. X-ray report: ascendant sub-type with many kinks.

Case 11.—A boy aged 1 year and 25 days, weight 7 kgrm. Stools once every day or every other day. X-ray report: transverse sub-type.

Summary.

1. A better classification for the shape of the large intestine in infants into a smooth type and a kinked type with sub-types is proposed.

2. It is submitted that, contrary to the prevailing idea, there is no real relation between kinking of the large intestine and constipation.

3. Constipation is rare in Egyptian infants, and four out of eleven cases of constipation were examples of Hirschsprung's disease.

THE SPECIFICITY OF HÆMOGLOBINS INCLUDING EMBRYONIC HÆMOGLOBIN

BY

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Many attempts have been made in the last fifty years to establish finally the specificity of the hæmoglobins of different animals. These hæmoglobins derived from various sources manifest their variations by differences in:—

i. Crystalline form (Reichert and Brown).
ii. Solubility.
iii. Serological precipitation (Bordet reaction).
iv. Affinity for CO and CO_2 (Boor and Hektoen[1]).
v. Time of decomposition by acids and alkalies.

The present investigation is mainly concerned with the fifth point, which is illustrated by the application of von Kruger's reaction to the various bloods under discussion.

Korber in 1866 had already made some experiments to prove that the blood pigment of different species of animals was decomposed at varying speeds by acids and alkalies, but deficiencies in his methods failed to convince the scientific authorities of his time, and it was left to von Kruger to work out a satisfactory practical method for the demonstration of the time factor by means of the direct-vision spectroscope. Through this instrument he viewed dilute solutions of the oxyhæmoglobin of different animals and estimated the time of its decomposition by dilute sodium hydroxide, by simply noting the time of the disappearance of the two typical absorption bands. The change over of oxyhæmoglobin into alkaline hæmatin is also accompanied by a physical colour change from bright red to yellow, but this does not give a sufficiently definite end-point for accurate experiments, especially with the more lengthy and drawn-out rates of decomposition. By spectrophotometric methods[2] these times of disappearance of the a and β bands of oxyhæmoglobin (Centres 578 λ and 540 λ) can be more exactly noted, and it has been found that the time factors obtained in von Kruger's reaction by a skilled observer, corresponds roughly to a 90-100 per cent. change of oxyhæmoglobin into alkaline hæmatin. If independent exact values are desired the readings at a 90 per cent. change can be constantly obtained by means of precision spectrographs, but for the experimental work described below the simplicity of the original direct-vision spectroscope method is to be preferred since it is quite adequate to demonstrate the essential differences discovered.

As a preliminary, tests were made on the oxyhæmoglobin of the human adult, the sheep, the cow and the rabbit. Afterwards oxyhæmoglobin from patients with various pathological conditions was taken and tested, and finally oxyhæmoglobin from the human placenta and from the new-born infant.

METHOD.—About 1 c.cm. of blood is withdrawn and hæmolysed by putting it into 10 c.cm. distilled water. The percentage of hæmoglobin is estimated at the same time separately in a Sahli-Leitz hæmoglobinometer. By calculation the hæmolysed solution is diluted to a ·1 per cent. concentration of hæmoglobin and filtered. Five c.cm. of the diluted solution is then poured into a clean test-tube which is clamped into position in front of the direct vision spectroscope previously adjusted to show the complete solar spectrum.

The α and β absorption bands are then sharply focussed before beginning the experiment.

One c.cm. of N/4 sodium hydroxide is then added to the solution without removing it from its clamp, and the moment of addition is measured on a stop-watch.

The fading of the two absorption bands is then watched narrowly through the spectroscope, and the final moment of disappearance is read off on the stop-watch. The end-point is very definite in the cases of quickly decomposed oxyhæmoglobin, but is rather indefinite in some of the lengthier observations. In these cases it is sometimes convenient to keep a tube at hand in which the reaction has been completed, and to substitute the tube for a moment or two as a control for comparison with the experimental tube.

Results.—For normal adult human blood the decomposition is complete in less than a minute and can be observed in its entirety; but for the oxyhæmoglobin of other types of animals, in which the decomposition takes anything from forty minutes to more than twenty-four hours, observations can only be taken at stated intervals. Some of these results are shown in Table 1.

TABLE 1.

TESTS ON VARIOUS TYPES OF BLOOD.

Type of blood	Time of decomposition
Normal adult human blood	40-60 seconds
Rabbit's blood	20-28 minutes
Sheep's blood	More than 5 hours
Placental human blood	40-60 minutes
Blood from patients with pernicious anæmia	40-60 seconds
Blood from patients with various pathological conditions, diabetes, nephritis, meningitis, etc.	40-60 seconds

All the readings shown in Table 1 were taken with daylight as the source of light. Readings taken with artificial light were more indefinite and were finally discarded.

For adult human blood, about 20 specimens were taken and the average of these readings (40 to 60 seconds) taken as a range for normal standard.

PLACENTAL BLOOD.—With the placental blood specimens, the end-point was difficult to fix. Readings were made from 26 specimens and were found to vary from 40 to 70 minutes, with an average of 53 minutes. In every case, whether the readings were 40 or 70 minutes, the decomposition takes definitely a much longer time than is the case of normal adult human blood, thus indicating that in the embryonic condition the blood-pigment of the human differs radically from the normal adult human blood pigment.

Whether the different human hæmoglobin, which for the sake of distinction we may designate as hæmoglobin-*a*, constitutes the whole of the blood pigment of embryonic blood or only a certain proportion, cannot be definitely settled by means of the experiments described.

Haurowitz[3] has already advanced the view that the hæmoglobin-*a* is a percentage only of the total pigment present in placental blood, but until experiments are devised for its isolation, separation and identification by means of any of its specific characters, the proportion cannot be regarded as definitely proved.

MATERNAL BLOOD.—The next step after satisfactorily proving the presence, even if not the proportion, of hæmoglobin-*a* was to find out if it was contained in the maternal blood.

In none of the cases examined, however, was the mother's blood found to differ from that of the normal human adult in its response to the von Kruger's reaction (Table 2). Its average reading was 40 seconds.

TABLE 2.

COMPARISON OF PLACENTAL AND MATERNAL BLOOD.

Case No.	Time of decomposition	
	Placental blood	Maternal blood
1	40 minutes	45 seconds
2	40 ,,	38 ,,
3	50 ,,	45 ,,
4	40 ,,	35 ,,
5	50 ,,	38 ,,

BLOOD OF NEW-BORN.—After this, it was decided to test the blood of new-born babies in order to see if hæmoglobin-*a* appeared in early extra-uterine life, and to see if possible at what age approximately the hæmoglobin-*a* disappeared from the circulation and was entirely replaced by the normal adult human type of blood pigment.

The experimental details were slightly modified as follows:—

Twenty mm. of blood were withdrawn from the heel of the child and placed into 1 c.cm. of distilled water. At the same time the hæmoglobin percentage was estimated separately as before, and finally by calculation the hæmolysed solution was diluted to a ·1 per cent. concentration of hæmoglobin. One-fifth volume of sodium hydroxide was added as before and the time of decomposition noted with the spectroscope.

TABLE 3.

READINGS OF NEW-BORN INFANTS' BLOODS.

Name	Age	Time of decomposition
Hale	2 hours	45 minutes
Carney	4 hours	60 minutes
Harborne	1¼ hours	45 minutes
Green	16 hours	40 minutes
Hinckley	18 hours	30 minutes
Wharton	19 hours	45 minutes
Howard	24 hours	36 minutes
Perry	24 hours	60 minutes
Silvester	2 days	30 minutes
Poole	3 days	55 minutes
Davies	4 days	49 minutes
Deeley	5 days	47 minutes
Jones	6 days	43 minutes
Key	7 days	48 minutes
Wiltiey	8 days	50 minutes
Green	16 days	40 minutes
Green	31 days	38 minutes
Kingston	1½ months	35 minutes
Hughes	4½ months	55 seconds
Fellowes	5 months	40 seconds
Thomas	6 months	40 seconds

It will be seen by the figures given in Table 3 that hæmoglobin-*a* persists in the circulation of the new-born child for some time after birth, definitely for one month at least. By 4½ months, however, there is no trace remaining and all the hæmoglobin is of the adult human variety.

According to Haurowitz[3], the differences in these various hæmoglobins depends on the specificity of the globin components and not on the different linkages of the prosthetic group. Barcroft has also advanced views in complete accordance with the theory, but the discussion of this problem lies rather outside the scope of this experimental investigation.

BLOOD DISEASES.—It was thought that perhaps in some of the pathological blood conditions—notably pernicious anæmia in which disease a theory has been advanced of a return to embryonic blood conditions—traces of the hæmoglobin-*a*, or other types of hæmoglobin, would be discovered, but such has not been the case.

In conclusion, I have to thank the Staff of the Maternity Block at Dudley Road Hospital for their courtesy in allowing me access to their patients, and for their assistance in helping me to obtain specimens of blood for investigation.

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VINCENT'S INFECTION IN CHILDHOOD

BY

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In his 39th letter dated 17th September, 1683, Leeuwenhoek vividly described and with fair accuracy figured for the first time, certain bacteria which he had found on his teeth. Amongst these may be recognized the micro-organisms subsequently known as Vincent's[1], who in 1896 described the fuso-spirochætal symbiosis in cases of hospital gangrene, and two years later[2] as a cause of pseudo-membranous angina. Vincent attached the greater importance to the fusiform rod, but noted the presence of the spirillum in at least 40 out of the 47 cases of gangrene, and in 15 out of the 18 cases of angina. Neither micro-organism was isolated in pure culture, nor did they appear to be pathogenic to normal animals. He found the fusiform micro-organism in the mouths of 14 out of 28 healthy subjects.

Incidence of Vincent's infection.—Vincent's micro-organisms have been found exceedingly hard to isolate and grow in pure culture, so from the bacteriological point of view astonishingly little has been added to these observations. On the other hand, the number of pathological conditions with which it is claimed they are associated has grown. Not only are they probably the causative micro-organisms of ulcerative stomatitis[3] and Vincent's angina, and were shown by Weaver and Tunnicliffe[4] to play an equally important role in the ætiology of noma; but they were also found by Wyatt Wingrave[5] in over 30 per cent. of his 500 cases of chronic aural discharge, by Pilot and Pearlman[6] in the majority of such fœtid discharges, and seem in the child occasionally to give rise to a specific acute otitis. Adam[7] mentions having treated over 30 such cases, all, with the exception of one, in children. Mangabeira-Albernaz[8] collected references[16] to other 30 cases, and Baremberg and Lewis have in particular given excellent clinical histories of this condition in children aged 3, 3½ and 4 years.

These cases are characterized by the profuse fœtid and sanguineous nature of the discharge, and the attendant pain. They resist ordinary treatment, but respond readily to arsenical preparations such as

sulpharsphenamine locally and systemically, or to the instillation of a bismuth preparation such as iodobismuthate of quinine (30 per cent.) in an oil emulsion. So far as could be determined from the few cases recorded the age incidence corresponds in the main to that of Vincent's angina.

A similar sanguineous muco-purulent nasal discharge, while generally associated with diphtheritic infection or with a foreign body, has also been associated with an infection of the nose by Vincent's micro-organisms. References to this condition are uncommon. Shulman[17], who reported one case in a child of three years, was only able to find reference to one previous case mentioned by Place[18]. Two further cases, also secondary to a buccal infection, were reported by de Angelis[19].

Cases suggesting a direct spread of these micro-organisms beyond the naso-pharynx into both the lungs and the intestinal canal have been reported. In 1906 Castellani[20] reported two cases of bronchial spirochætosis, in one of which the blood showed a mononucleosis (11,000 leucocytes with 21 per cent. mononuclears). In the same year Feldman[21] published a series of autopsies in which these micro-organisms appeared to have played an important role; one case being of a boy 4½ years old in whom there had been pulmonary gangrene following noma and fuso-spirochætal infection of the lung. Four years later Buday[22] added to these observations, and Rothwell[23] published in America an acount of 'bronchial Vincent's angina,' but it was not until 1926 that Vincent[24] asserted the identity of spirochæta bronchialis with the spirochæte of the fuso-spirochætal symbiosis. The following year D. J. Smith[25] published experimental work suggesting that these micro-organisms also played an essential role in the production of pulmonary abscess.

In infections of the intestinal canal these organisms are rarely found. Although Escherich[26] in 1884 had described spirochætes in the stools of infants suffering from infantile cholera, and in 1897 Booker[27] had published a very suggestive autopsy on a child aged six weeks, it was, with the exception of Le Dantec's[28] publications on 'spirillar dysentery,' not until 1917 that Luger[29] began to stress the rare occurrence of the fuso-spirochætal symbiosis in infections of the intestines, an aspect of spirochætal infection which he and Silberstern[30] have recently reviewed.

Neither the pulmonary nor the intestinal forms of fuso-spirochætal disease appear to have the peculiar predilection of the buccal manifestations for children and soldiers, an age incidence which was recognized long before* Vincent's or Plaut's[31] description of these micro-organisms.

In 1917 there were, for instance, 261 primary admissions for Vincent's disease among American enlisted men, and in 1918 and 1919 there were 1,762

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* For references to early literature and history, see Hirsch[54] and Rilliet and Barthez[55].

and 4,159 respectively[32]; but subsequent to the war this peculiar incidence became obscured, and particular attention began to be paid to a number of obscure systemic conditions in which there were notable changes in the blood picture and in which Vincent's disease appeared to play some part. These micro-organisms became associated with cases of glandular or infectious mononucleosis and were present in presumably abnormal quantities in 3 out of 4 Bloedorn and Houghton[33] cases, who suggested the possibility of a relationship between the two conditions. They were found in 3 cases out of 10 by Longcope[34]; 4 out of 9 by Downey and McKinlay[35]; 27 out of 29 by Baldridge, Rohner and Hansmann[36]; and in 6 out of 12 cases by Cottrell[37], who concludes that ' the association of spirilla and fusiform bacillus of Vincent . . . is frequent enough to give rise to a strong suspicion at least of a casual relation.' They were the micro-organisms ' most frequently encountered ' in the case reports of angina agranulocytica, with which the literature now began to abound[38].

In 1929 Zikowsky[39] reported a series of cases of Vincent's angina with a mononuclear response, an enlarged spleen, and general glandular enlargement. He suggested that many cases reported as mononucleosis, glandular fever and monocytic angina were cases of fuso-spirillar infection. He considered it improbable, however, that these conditions were in any way related to the acute lymphatic leukæmias which they occasionally resembled so closely clinically. But Warren[40] in his recent review of 113 cases of leukæmia stated that Vincent's organisms were prominent in 50 per cent. of the cases, and this conjunction of conditions is generally considered to be not infrequent.

Few[41], however, have the temerity even to suggest more than a coincidental relationship, though there are many[42] who believe that in every case a ' leukæmia ' follows an infectious malady, whether Vincent's disease or some other condition, and see in the blood changes an expression of the inability of the so stimulated hæmatopoietic system to revert to the normal.

The majority of these cases, totalling a whole series of different associated infections, have been reported in adults (see Donath and Saxl[43] for a recent review with references).

In 1930, however, two detailed case reports of such associations in childhood appeared. Lundholm[44] published a case of staphylococcal sepsis in a girl of $3\frac{1}{2}$ years that developed into an acute lymphatic leukæmia. Bonciu and Ionesco[45] reported the case of a little girl with a hæmolytic streptococcal septicæmia and similar blood changes.

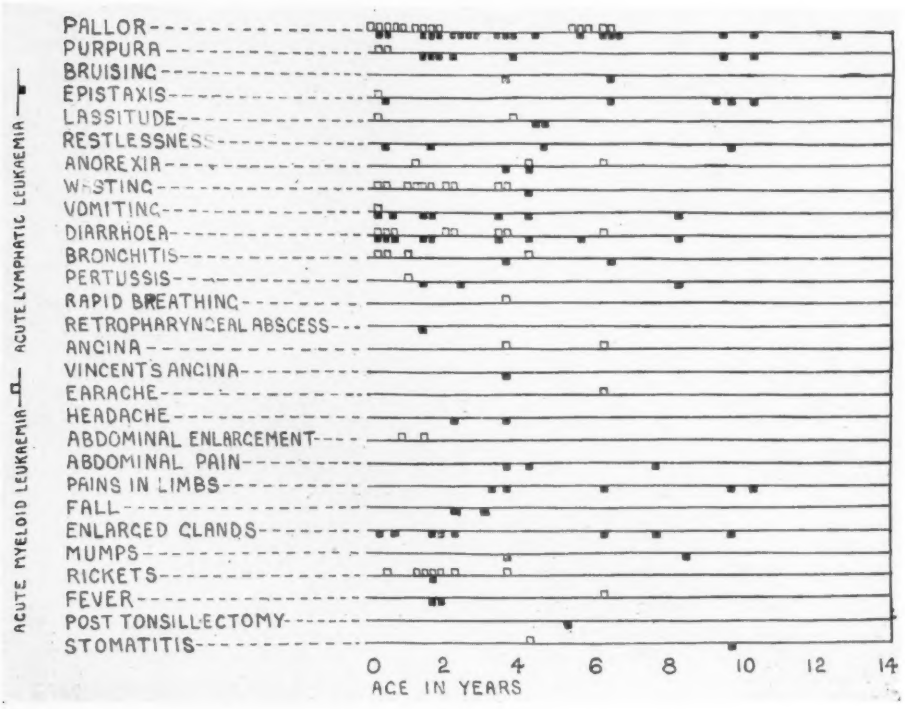
We were particularly interested in this aspect of Vincent's infection in childhood, but while generalizations on the apparent mode of onset of the leukæmias have been made, and individual cases reported, detailed analyses appear to be few in the literature. Ward[45] gave a statistical review in 1917.

Ramsay[46], who recently analyzed the symptomatology of the leukæmias in childhood, noted the absence of any such analyses but himself dismisses initial symptoms and apparent mode of onset in a short paragraph.

Morse[47] in 1922 discussed the onset of 12 cases of undoubted lymphatic leukæmia. There were 4 boys and 8 girls. In one case the malady developed during convalescence from scarlet fever; another apparently followed a fall. In the other cases there was no apparent ætiology. 'The

GRAPH I.

APPARENT MODE OF ONSET OF 40 CASES OF MYELOID LEUKÆMIA AND 60 CASES OF LYMPHATIC LEUKÆMIA IN CHILDHOOD.



first symptoms noted were enlarged glands in the neck, vomiting, hæmorrhage, each in two instances; weakness, fever, sore throat, anorexia, pallor and abdominal pain, each in one.'

Poynton, Thursfield and Paterson[48] undertook a general analysis of 18 cases of leukæmia; 14 of these were diagnosed as acute lymphatic leukæmia, two as myeloid, and two were apparently of a mixed type. Of the 14 cases of acute lymphatic leukæmia 10 were in boys. 'In eight cases the illness developed so gradually that their duration was uncertain; five apparently followed an attack of pleurisy, pneumonia or bronchitis. In two cases diphtheria was the antecedent, and in one a cold three weeks before admission. In another case there was an alveolar abscess.' They incline to the belief

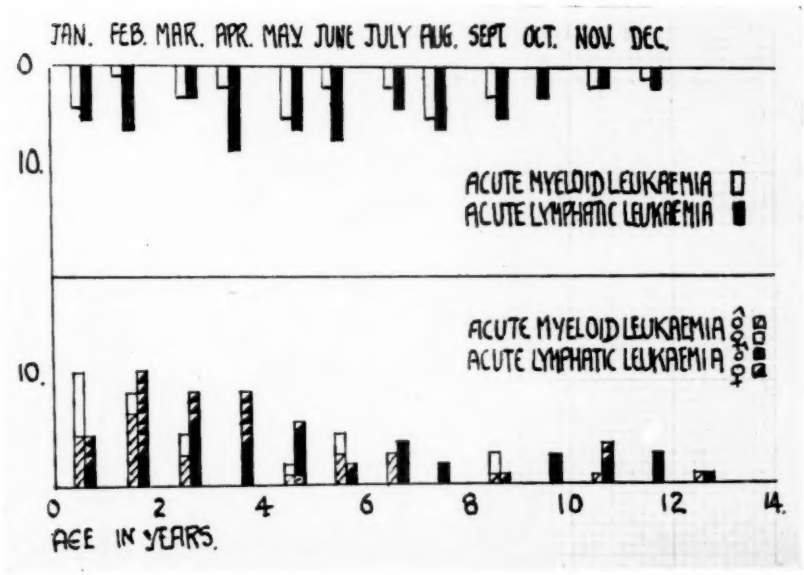
that the solution of the problem of leukæmia lies rather in some peculiar reaction than in the existence of some specific infective agent.

Present investigations.

An attempt was made to determine the mode of onset of leukæmia in the child in a rather larger series. For this purpose, despite the opinion of those such as Gulland[49] who consider differentiation in these acute conditions

GRAPH II.

SEASON AND AGE AT ONSET OF 40 CASES OF MYELOID LEUKÆMIA AND 60 CASES OF LYMPHATIC LEUKÆMIA.



into lymphatic and myeloid forms to be often illusory and impracticable, we have observed such a distinction in our series and have been impressed by the great rarity of the latter condition in childhood. In Graphs I and II the results of this inquiry are summarized.

Twenty-four of the cases of acute lymphatic leukæmia and four of the cases of acute myeloid leukæmia are taken from the records of the Harriet Lane Home, the Johns Hopkins Hospital, and the rest of the cases from the literature. The mode of onset was found to be protean if often appropriate to the age of the child, diarrhœa and vomiting being common in infancy, and pains in the limbs or abdomen more frequent in older children.

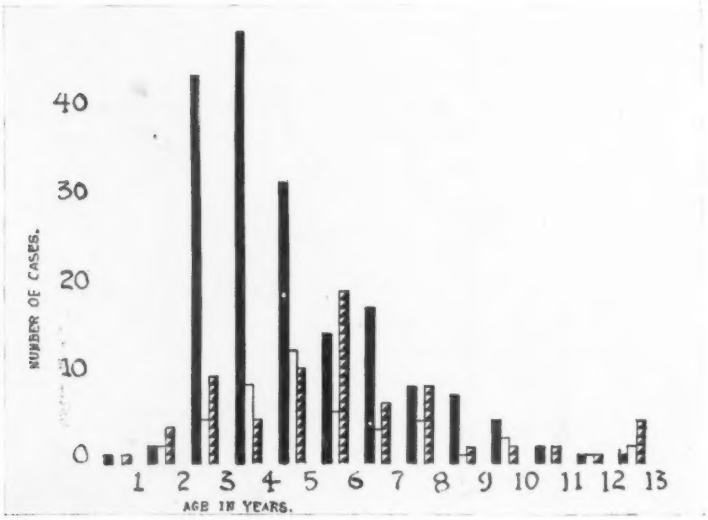
For the season of onset a considerable degree of impartiality was shown, and, while the age of onset differed in the two types, in neither did it conform with the incidence of Vincent's infection; examples of this infection apparently initiating a leukæmia in the child were significantly few.

In Graph III is tabulated in the following order the age incidence of a series of cases of ulcerative stomatitis, noma and Vincent's angina derived from the Harriet Lane Home records and the literature[50-56].

It is apparent that so far as these figures, chosen at random, are concerned, this peculiar incidence is definite and confined to a few years in childhood, and that a brief interval separates the period of maximum incidence of each condition. This existence of a definite age incidence confined to a few years implies the operation of some common general factor, and a corresponding simplification of the factors concerned in the production of that disease. The manifestations of Vincent's disease may be classified,

GRAPH III.

AGE OF ONSET OF VINCENT'S STOMATITIS, NOMA, AND VINCENT'S ANGINA IN THIS ORDER.



so far as the figures met in our analyses are concerned, into three main clinical groups. In one we have a series of acute manifestations occurring in the mouth and naso-pharynx, and in all these examples there is a definite and similar age incidence. In a second group, on the whole uncommon in childhood, there are local changes in tissues remote from the naso-pharynx. Finally, in a third group, buccal manifestations are associated with obscure general conditions of considerable interest, but here the age incidence, when apparently definite, as in angina agranulocytica (recently reviewed by Hueber[57]), differs markedly from that of the first group, or else, as in the case of the leukæmias, the association appears to be more marked in the adult than in the child.

We hoped that a clearer knowledge of the factors operative in the first group would assist in the understanding of the role played by this infection in the latter group.

At birth, the mouth of the child is sterile (Campo[58]), though not infrequently, as Bonnaire and Keim[59] demonstrated, it becomes infected in the course of the passage of the head through the vagina. Within a few hours of birth it becomes infected with the majority of common air-borne micro-organisms such as streptococci, pyogenes and salivarious, pneumococci, staphylococci, sarcinæ, B. coli and B. subtilis. About the twelfth day, as Brailovsky-Lounkevitch[60] points out, ten days or so after the B. bifidus has become predominant in the intestine, S. salivarius becomes prominent in the mouth, though not in a sufficient degree for one to be able to speak of a normal buccal flora. With the onset of dentition a notable change occurs in the mouth of the child, and the micro-organisms found tend to resemble those found in the mouth of the adult and Vincent's micro-organisms now begin to appear. The frequency with which these micro-organisms are said to be found in the normal adult mouth has varied greatly with different observers. A great deal of this discrepancy can be attributed to the efficiency of the method employed in collecting and examining the material.

The sudden importance this condition acquired during the past war led to a considerable amount of fresh work being undertaken. Reckford and Baker's[61] findings are rather frequently quoted. They found on examining smears from the mouths of 50 normal individuals (soldiers) only one positive result for spirilla and fusiform bacilli. Their results are not in accordance with the results of Semple, Price-Jones and Digby[62] who found that in the case of 512 soldiers of all ages from 18-35 years and upwards, fusiform bacilli were present on the gums in 489 cases (95·5 per cent.), and spirochætes in 488 cases (95·3 per cent.). They conclude that these micro-organisms are normal inhabitants of the human mouth and that in cases of gingivitis and Vincent's angina they are enormously increased in number. Our few figures point to the same conclusion, and this is indeed the opinion of the vast majority of workers in this particular field [63, 64].

The exact time at which these organisms appear in detectable quantities in the mouth of the child has been the subject of few investigations. Violle's[65] statement that they appear at about the fourth or fifth year as a result of eating earth-contaminated food, and an early paper by Oshima[66], were the only two references we were able to discover; yet the peculiar age incidence of this group of diseases under normal conditions suggested that such a determination might prove not without interest, while the findings of Pilot[67] and others that these organisms are present in some 82 per cent. of tonsils examined suggested the necessity of including them in any scheme of investigation.

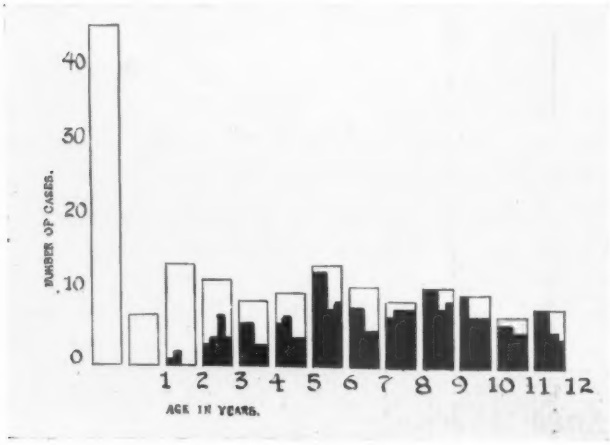
The gums, teeth and tonsils of 168 children were therefore examined for these organisms, adopting for this purpose a special technique, the material being aspirated from the margin of the gums and teeth and from the tonsils by means of a ' straw ' and rubber bulb, and mixed in $\frac{1}{2}$ c.cm. of normal saline. Drops of this mixture were placed on slides and allowed to dry, fixed

and stained by the Harris[68] modification of Kliewe stain for spirochætes, and in the first 75 cases, drops were also studied under the dark field. The close identity of our results led us to rely in our later examinations upon the Harris stain alone.

Throughout this work particular attention was paid to the condition of the teeth and gums and to the tonsils in relation to our findings. Enormous quanities of Vincent's micro-organisms were present in the mouths of children with perfect teeth and gums, who confessedly had never brushed their teeth in their lives; in certain cases where they did begin to brush their teeth regularly these micro-organisms became very hard to detect. They were, however, invariably present in lesser quantities in older children who had faulty teeth and diseased gums, but it seemed to us that this was due

GRAPH IV.

INCIDENCE OF VINCENT'S SPIROCHATE AND THE FUSIFORM ROD ABOUT THE GUMS AND THE TONSILS OF 168 CHILDREN.



N.B.—The positive findings are in black; each column is made up of four columns representing from right to left Gums:—Spirochete, Fusiform. Tonsils:—Spirochete, Fusiform.

not so much to these specific conditions, as that they rendered a reasonable degree of buccal hygiene impossible.

In Graph IV we have tabulated briefly our results. Vincent's micro-organisms appear to invade the mouth over the same age period as that in which the maladies, in Group 1, associated with these organisms commonly occur. It is suggested that this is not a simple coincidence, but that Vincent's organisms, while as a rule non-pathogenic, are so in part by virtue of their host's resistance, and may be pathogenic at their time of invasion, before balance is achieved. Subsequently this balance may rock, but then it is necessary to postulate a further factor, either, as in Group 2,

the invasion of fresh tissues, or else a lowering of the resistance of the host, or enhancement of virulence; and this would imply, as is indeed generally held, that the manifestations of Vincent's infection in Group 3 are to be considered in all probability as secondary to the general condition.

Summary and conclusions.

The manifestations of Vincent's infection in the child have been summarized and the peculiar age incidence emphasized.

The apparent mode of onset of the acute leukæmias in childhood has been surveyed, but little support found for the hypothesis that these conditions were secondary either to Vincent's disease or other septic infection.

The age incidence of Vincent's organisms was determined in the mouths of 168 normal children. It is suggested that this incidence bore a relationship to the age incidence of the maladies associated with these organisms and constituted further evidence in support of the belief that these organisms were but secondary invaders in the conditions of angina agranulocytica, infectious mononucleosis and the acute leukæmias.

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THE USE OF RADIOSTOLEUM AND CALCIUM SALTS IN RHEUMATISM

BY

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In the absence of the known causes of rheumatic diseases in children, it becomes important that we should study all the factors which may be contributory to it. It is generally realized that rheumatic disease is essentially a disease of the poorer classes of the population, and a study of the diet of such families shows a strikingly low consumption of animal fats—largely owing to the expensive nature of such foods: this means a correspondingly low consumption of the fat-soluble vitamins A and D.

There are two indications that a special ration of these fat-soluble vitamins may be a prophylactic measure. In the first place as a result of experimental work on animals[1], and the results of Mellanby[2] in cases of puerperal septicæmia, it is generally accepted that vitamin A is a valuable anti-infective factor. Secondly, in cases of chorea, it has been shown that there is a small fall in the blood calcium and a marked percentage fall in the cerebro-spinal fluid calcium[3]. We know that vitamin D is essential for the retention and utilization of calcium salts, as has been shown in rickets and infantile tetany, and in osteomalacia and allied bone diseases.

Over a period of three years, at the rheumatism clinic at the Miller Hospital, such ration of extra vitamins has been administered in the form of radiostoleum (B.D.H.), the preparation recommended by Mellanby, in doses of a quarter of a drachm twice daily, made into an emulsion with olive oil m. 15, gum acacia gr. 7, elixir glusidi m. 5 (as recommended by the manufacturers); together with calcium gluconate or calcium lactate in ten grain doses twice daily. In the earlier stages, parathyroid extract (Martindale), was also given by mouth in doses of $\frac{1}{20}$ gr. twice daily, but as it appeared to make little or no difference to the blood calcium, this was subsequently omitted. Radiostoleum is believed to possess twenty times the vitamin-A, and 100 times the vitamin-D content of cod-liver oil. In most of these cases the children have attended regularly each four or six weeks for a fresh supply, and a record kept of their clinical condition. A few children ceased attending for periods, perhaps on account of moving their homes, or

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being sent for a period of convalescence, or again due to admission to hospital on account of a rheumatic relapse. Unless the preparations had been taken for at least three months in each twelve months, it was considered that no medicine had been given.

As a control to this special series, all the other rheumatic children have been used. Again they have been classified according to whether they had the particular medicine for a period of at least three months. The usual dose of cod-liver oil and malt and Parrish's food given was 2 drachms of each three times daily to a child of ten, with a corresponding reduction to younger children. The children marked as having 'no medicine' either had no medicine at all, or were given a simple coloured syrup mixture which would have no medicinal value, but assured their regular attendance, or else had some preparation for less than three months each year.

If the group given radiostoleum and calcium were benefited, this should show in more than one way. The results are given under three headings:—

(1) The number of definite relapses of acute rheumatism, subacute rheumatism, rheumatic carditis or chorea.

(2) Of the cases showing relapse, the number of cases which showed active carditis. These cases may be such as had an old cardiac lesion which had remained stationary, but which showed evidence of activity in the attack of rheumatic disease; or such as developed carditis for the first time.

(3) The gain in weight of the children.

Each of these groups has to be considered in relation to the average age of the children, an important factor originally emphasized by Wilson, Lingg and Croxford.

On account of the fact that the records were sometimes interrupted for a long period, as by hospital treatment at special centres, it was found best to record the results separately for each year under observation: thus we have recorded the number of children in each group, and also the total number of yearly attendances. It has also been necessary to do this because sometimes the medicine had to be changed as a child got tired of one and had to be changed to another. This occurred least often with the calcium-radiostoleum group, and most of the chidren who had radiostoleum had it regularly the whole year through.

The frequency of rheumatic relapses.—These results are briefly recorded in Table 1. From this table it seems quite fair to compare the results with one another as the ages are comparable. It seems that the relapses are fewer in the groups having the calcium and radiostoleum, and there is some benefit by giving malt and cod-liver oil, particularly in subacute rheumatism and chorea.

TABLE 1.

	Number of cases		Number of yearly attendances		Average age		RELAPSES: Acute rheumatism		Acute rheumatism & chorea		Carditis only		Sub-acute rheumatism		Chorea		RELAPSES: Number		As percentage of yearly attendances	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Radiostoleum and calcium	7	21	11	40	8·5	9·4	0	2	0	1	0	1	0	1	1	5	1	10	9	25
Cod-liver oil, malt and Parrish	29	32	40	43	8·5	8·7	1	0	0	0	0	0	6	7	1	3+1 twice	8	12	20	28
Cod-liver oil and malt	23	29	30	55	8·0	8·7	0	0	0	0	1	0	2	4	3+1 twice	14	8	18	27	33
No medicines ...	19	24	25	31	8·4	9·0	0	0	0	0	0	0	3	2	2+1 twice	10	7	12	28	39
Parrish	7	25	7	29	9·3	9·5	0	0	0	0	1	0	1	2	1	5	3	7	43	24

The frequency of carditis in the rheumatic relapses.—The results are shown in Table 2.

TABLE 2.

	No. of cases.		No. of yearly attendances		No. of relapses		Active carditis: Number		Active carditis: As percentage of yearly attendances	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Radiostoleum and calcium	7	21	11	40	1	10	0	5	**0**	12·5
Cod-liver oil, malt and Parrish	29	32	40	43	8	12	2	3	5	7
Cod-liver oil and malt	23	29	30	55	8	18	3	0	10	0
No medicines ...	19	24	25	31	7	12	1	3	4	10
Parrish	7	25	7	29	3	7	2	1	29	3

It does not appear that the radiostoleum or any of the other preparations have any value in preventing an attack or relapse of carditis: the results with Parrish's food administered to boys are probably fictitious owing to the small numbers in this group.

The influence of radiostoleum on the gain in weight.—A regular record of the gain in weight of the children is essential in estimating their progress. We are entirely in agreement with Carey Coombs when he said recently that a child who is consistently gaining weight at a fast rate is very unlikely to show a rheumatic relapse.

TABLE 3.

THE GAIN IN WEIGHT PER ANNUM EXPRESSED IN POUNDS AND OUNCES.

BOYS.—Age	5-6	6-7	7-8	8-9	9-10	10-11	11-12		
Radiostoleum and calcium...	—	—	5-5	6-6	6-6	—	—		
Cod-liver oil, malt and Parrish	5-9	4-13	7-7	4-11	6-3	6-12	8-14		
Cod-liver oil and malt ...	4-13	7-9	5-15	6-12	6-4	6-13	—		
No medicines	5-4	5-2	5-6	4-7	11-11	5-10	5-2		
GIRLS.—Age	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14
Radiostoleum and calcium...	—	5-11	5-6	9-4	5-3	7-5	8-1	7-11	13-11
Cod-liver oil, malt and Parrish	3-8	6-2	6-6	7-0	9-4	9-3	5-8	9-5	—
Cod-liver oil and malt ...	6-0	4-15	7-5	7-10	6-8	6-15	9-13	15-9	16-13
Parrish	3-14	—	6-0	7-11	6-12	10-2	10-4	—	11-12
No medicines	6-3	7-3	5-6	5-5	5-7	4-6	13-2	—	11-4

From this series the children having the preparations of vitamin value have not gained weight any more rapidly than those to whom no medicine had been given.

The influence of radiostoleum on the total blood calcium.—On a series of 15 patients to whom calcium salts and radiostoleum have been administered regularly the whole time, blood calcium estimations have been performed at periods of 3 to 30 months after the administration, and the results compared with the values existing beforehand. The average value before was 10·13 mgms. per cent., and afterwards was 10·01 mgms. per cent.

Discussion and Conclusions.

From this series of cases it appears that an increased ration of vitamins A and D in the form of regular doses of radiostoleum (equivalent in terms of vitamin A to $1\frac{1}{4}$ oz. of cod-liver oil, and in terms of vitamin D to $6\frac{1}{4}$ oz. daily), with calcium, has some action in preventing relapses of chorea and subacute rheumatism; but is of no value in preventing the onset or relapse of carditis; nor has it raised the total blood calcium. It may be that to obtain a more decisive result much larger doses would have to be given, but the dose administered corresponds in this case to a good dose of cod-liver oil.

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SINUSITIS IN CHILDHOOD

BY

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Sinusitis as a common source of ill-health in children has received but little attention in English medical publications: in American, Canadian and Australian journals articles on this subject have been frequent, its importance being fully recognized by physicians dealing with children. Though in the United States many varieties of common naso-respiratory complaints in children, formerly persistent and troublesome, are now being successfully treated as manifestations of sinusitis, in England these equally common complaints, such as ' winter coughs,' ' wheezy chests ' and ' running noses,' are still widely accepted as chronic nasal catarrh and bronchitis. Sinusitis indeed is frequently regarded as a typical American disease, occurring seldom in Great Britain, and attributable to the inclement weather of the United States and the dry over-heated air of American dwellings. That this attitude is unwarranted, sinusitis being a common affection among English children and living conditions only in a minor degree responsible for the disease, is the theme of this article.

In 1913, McKenzie[1] reported three cases of chronic sinusitis in children successfully treated by operation, and in the following year Tilley[2] reported three other cases, giving details of the procedure. Watson-Williams[3] in 1921 wrote on the clinical import of familial infection of chronic sinusitis, dealing with the ' carrier infectivity ' of one or more members of the same family. He emphasized the relation between chronic sinus suppuration and appendicitis, his contention being that ' behind the euphemism ' chronic cold ' there often hides a disastrous menace.'

The chief contribution to the subject in English medical journals is that of Mollison and Kendall[7] in 1922. They investigated the incidence of sinusitis in children who were undergoing operations for the removal of tonsils and adenoids, Mollison being convinced that sinusitis was far commoner than usually believed. The results confirmed his conviction. He and Kendall explored the antra of 102 children and discovered pus or mucus in more than 20 per cent. The writers found that puncture of the antra was not followed by ill-effects, that exclusion of antral suppuration as a source of nasal catarrh was necessary especially when tonsils and adenoids had been previously removed, and that removal of tonsils and adenoids in most cases effected a cure.

Watson-Williams[5] in 1928 reported the incidence of pneumococcus infection in the sinuses of 242 children. In 1929 he with Pickworth[6] discussed the importance of recognizing chronic sinus suppuration in cases of gastro-intestinal and pulmonary infective diseases, but only with incidental reference to children. In 1921 Cleminson[8] had written about the importance of investigation of the antra in naso-pharyngeal catarrh in children, especially if removal of tonsils and adenoids had failed to effect a cure.

The articles mentioned above virtually exhaust the bibliography in English publications on sinusitis in children. It will be noted that the most important contribution, that of Mollison and Kendall, deals only with cases that were selected because of tonsillar infection or adenoids. They do not cover sinusitis occurring in children in whom tonsils and adenoids have already, perhaps long ago, been removed.

Present investigations.

The writer, having worked for several years in children's hospitals in America, and being accustomed to the prevalence of sinusitis there, was much impressed after returning to England in September, 1931, by the frequency and persistence of naso-respiratory infections in hospital patients in this country, by their resistance to ordinary methods of treatment for colds, by the fatalistic attitude of mothers to such complaints as ' wheezy chests ' and ' running noses,' and finally by the tendency of the medical profession to overlook the possibility of sinusitis in such cases. So many children presented the typical clinical picture of chronic sinus infection, although their living conditions differed greatly from those of the corresponding class of patients in America, that the author undertook to investigate the incidence of sinusitis among the out-patients who came directly under her observation at the Hospital for Sick Children between November, 1931, to June, 1932.

Every child who came for treatment presenting all or several of the cardinal symptoms of sinus infection, such as persistent cough, recurrent colds with or without a ' wheezy chest,' nasal obstruction and, most important of all, a post-nasal muco-purulent discharge, was considered on clinical grounds a possible case of sinusitis. All were radiographed for more precise diagnosis, and for purposes of active treatment the radiological findings were taken as conclusive, although, as will be seen below, there is reason to believe that many of the children who presented negative X-ray findings were suffering from sinusitis.

At first all the suspected cases were transilluminated, but this procedure was found of little value, as transillumination results frequently failed to be corroborated by radiograms and exploration. When the radiologist pronounced the antra as infected or ' opaque,' the patient was regarded as suffering from chronic sinusitis, and was treated either surgically by puncture and irrigation, or medically by nasal drops, steam inhalation, and breathing exercises. All the children received cod-liver oil and malt in doses of from two drachms to half an ounce three times a day in order to raise their resistance to infection, and all particularly debilitated children were sent to convalescent homes for periods varying from two to three months. The ultimate results will be considered below.

The brief details of signs, symptoms, diagnosis, treatment, and results of 72 patients under observation have been set forth in two adjoining tables.

Table 1 deals with 33 patients, or 46·8 per cent. of the total number, in whom the clinical diagnosis was confirmed by the radiologist; and Table 2 covers 39 children presenting clinically a similar picture, but whose skiagrams failed to show any involvement of sinuses.

TABLE 1.

No.	Sex	Age	Weight in lb.	Cough	Colds	Anorexia	Debility	Headache	Lungs: symptoms	Nasal obstruction	Post-nasal discharge	Tonsils	Otitis	Cervical adenitis	Mantoux reaction	X-ray of antra R	X-ray of antra L	X-ray of chest	Exploration of antra	Pus	Serum	Nil	Convalescent home	Results
1	M	4½	45	+	+	+						normal		+	—		+	+					+	improved
2	M	4	37	+	+				+	+		+				+	+							not known
3	M	3½	27	+	+	+	+			+	+	+				+	+							,,
4	F	5½	38	+	+	+	+					out			+	+		+	+		+		+	improved
5	M	10	58	+	+		+	+		+		,,					+		+			+		,,
6	F	3	32	+		+			+			,,			—	+	+							not improved
7	M	9½	44	+	+	+	+		+	+	+	normal				+	+		+		+			very good
8	F	12	74	+			+		+			out	+	+	—		+	+	+		+		+	,,
9	M	4	32	+	+		+			+	+	out				+	+		+	+			+	,,
10	F	12	56	+	+			+		+		+				+	+	+					+	,,
11	F	8	64	+	+					+		+				+			+	+				good
12	M	4	38	+	+	+					+	out		+		+	+		+	+				not known
13	M	5½	43	+	+	+	+			+	+	,,	+			+	+		+		+			good
14	F	12	58	+	+					+	+	,,				+	+		+	+			+	,,
15	F	10½	68	+	+			+	+	+	+	+				+	+		+		+		+	very good
16	M	5½	37	+	+	+	+		+			out			—	+	+	+					+	improved
17	M	6½	44	+	+	+	+					,,			+	+	+	+	+		+		+	very good
18	M	11½	54	+	+		+	+	+		+	,,				+	+		+			+		,,
19	F	9½	51	+			+					,,			+	+	+	+	+	+	+			improved
20	M	6	41	+			+					,,	+	+	—	+	+		+		+	+	+	not known
21	M	10	64	+	+	+	+	+				,,			+	+	+	+	+			+	+	not improved
22	F	12	81	+	+					+	+	,,		+			+							not known
23	M	10	69	+			+	+		+	+	,,					+		+					,,
24	F	11	64	+	+			+		+	+	+				+	+	+	+	+			+	improved
25	M	7	45	+	+					+	+	,,		+	+		+		+		+			,,
26	F	7	44	+	+		+		+		+	,,		+	—	+			+	+				,,
27	M	10	80	+	+			+		+	+	,,	+			+			+	+				good
28	M	11	67	+	+	+	+	+		+	+	,,		+		+	+		+		+		+	improved
29	F	6½	44	+	+						+	,,	+	+		+	+							not improved
30	F	9	73	+	+	+	+		+		+	,,		+	+	+		+	+	+			+	not known
31	F	5½	42	+	+							,,				+		+	+	+				,,
32	F	12	63	+	+							,,				+								,,
33	M	5	35	+	+		+				+	,,				+	+							,,

An examination of Table 1 reveals the following points:—

Sex.—Of the 33 cases of maxillary sinus infection 18 were males and 15 females.

Age.—The age of the children ranged from 3 years to 12, and 17 of the total were 9 or below. The age was taken as of the day of diagnosis.

Persistent cough.—This occurred in all the children. It generally lasted for months, worse in the morning or at night, disappearing in summer and recurring in autumn, with periods of exacerbations coincident with fresh colds and bronchitis.

Colds.—Frequent naso-respiratory infections were reported in 28 cases and were described by mothers as ' wheezy chest ' and ' running nose.'

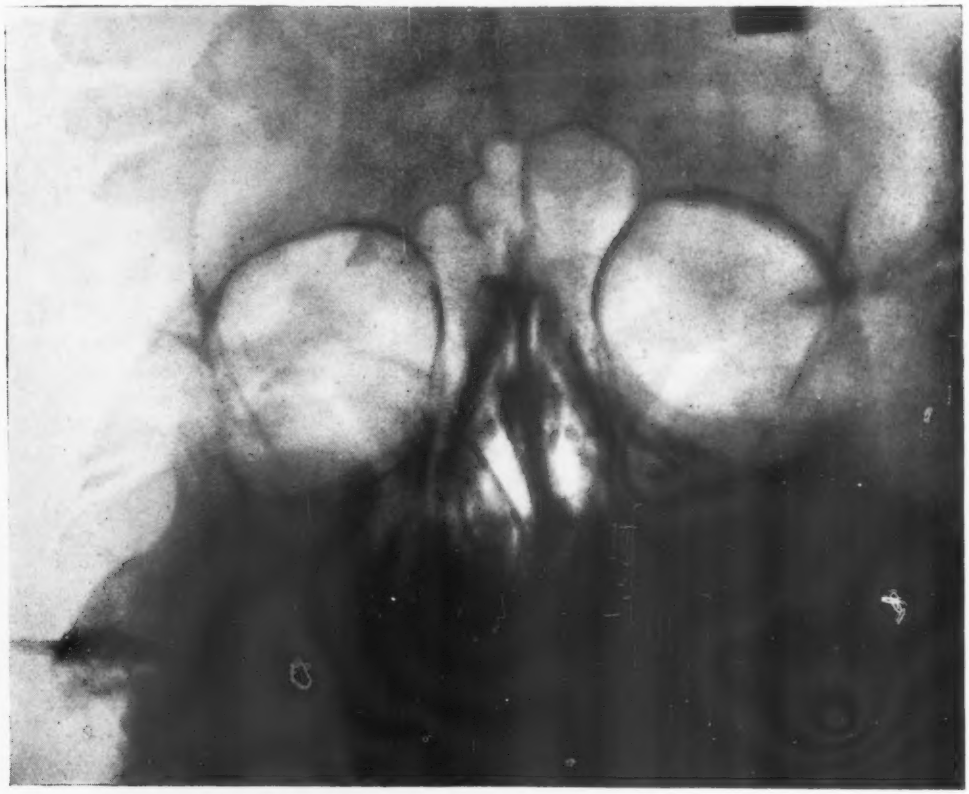

FIG. 1.—(Case 9, Table 1): both antra opaque; pus discovered in both.

Anorexia of a persistent nature was recorded in 12 children.

Debility as manifested by loss of weight, insomnia, fatigue and pallor was a definite complaint in 13 cases.

Headache, which is an important symptom of sinusitis in adults, was found only in 9 cases, all occurring in children of over 10 years.

Lungs.—Although most patients gave a history of frequent bronchitis, only 9 at the time of diagnosis showed positive clinical signs on examination of the lungs.

TABLE 2.

No.	Sex	Age	Weight in lb.	Cough	Colds	Anorexia	Debility	Headache	Lungs : symptoms	Nasal obstruction	Post-nasal discharge	Tonsils	Otitis	Cervical adenitis	Mantoux reaction	X-ray of head	X-ray of chest	Exploration of antra	Pus	Serum	Nil	Convalescent home	Results
1	F	5	35	+	+				+		+	out				Nil						+	not known
2	M	9	51	+	+				+	+		+		+		,,	+						good
3	M	8	71	+	+			+	+			out			+	,,	+					+	not improved
4	M	9	49	+	+	+	+		+	+		,,		+	+	,,	+					+	,,
5	M	8	42	+	+					+	+	,,				,,							good
6	M	8	54	+					+		+	,,		+	—	,,	+					+	improved
7	F	8½	59		+					+	+	+				,,		+			+	+	not improved
8	M	8½	59	+	+	+			+	+		+		+	—	,,	nil					+	improved
9	F	9	54	+	+	+	+			+		+			+	,,	+						not known
10	F	7½	48	+	+	+	+			+		out		+	—	,,	+						,,
11	M	10½	50		+		+					+		+	—	,,	+					+	improved
12	M	9½	51	+	+		+			+		normal			+	,,	+						not improved
13	F	8	48	+					+	+		+				,,	+						very good
14	M	9½	56	+	+		+		+		+	out			—	,,						+	not improved
15	M	9	73	+								,,		+		,,							not known
16	F	4½	41		+	+				+	+	+		+		,,							improved
17	M	9	49	+	+	+				+	+	out	+			,,		+	+				,,
18	M	8	62	+	+				+	+		+		+	—	,,	+					+	not known
19	M	9	65	+	+			+		+	+	out			+	,,	+					+	good
20	M	7½	42	+	+				+	+	+	,,		+	—	,,	+					+	not improved
21	M	4½	36	+	+	+			+		+	,,		+		,,		+			+	+	very good
22	F	8	37	+	+	+	+			+	+	,,		+	—	,,						+	not known
23	F	2	80½	+			+					,,				,,	nil						,,
24	F	7			+	+				+		,,			—	,,							not improved
25	M	8		+		+	+		+			,,		+	—	,,	+						,,
26	M	2		+						+	+	+	+	+		,,						+	good
27	M	11		+	+	+				+		out	+	+		,,							improved
28	F	5½		+							+	,,	+			,,							,,
29	M	10		+	+							normal			+	,,							not known
30	M	6		+					+			+			+	,,	+						good
31	M	7	52		+							out		+	—	,,	+						not known
32	F	6	39	+			+				+	+	+		—	,,	nil					+	improved
33	M	7		+				+	+	+	+	out		+		,,	nil						not improved
34	M	9	53	+	+	+		+				,,				,,							not improved
35	F	9	51	+	+						+	,,				,,	+						not known
36	F	7	45	+	+	+	+		+	+	+	,,			—	,,	+						,,
37	M	5	37	+	+					+	+	,,		+		,,							very good
38	M	10½	58	+	+		+					,,			—	,,						+	very good
39	M	8	63		+	+				+	+	,,				,,							good

Condition of the nose and throat.—Eighteen children were mouth-breathers with nasal obstruction caused by deviated nasal septum, hypertrophied turbinates, collapsed alæ nasi and a varying amount of nasal discharge. Seventeen of the 33 children showed a thick post-nasal discharge. Only two patients had apparently normal tonsils, while 6 had infected tonsils; in the remaining 25 the tonsils had been removed previously.

Radiological examination.—Of the 33 patients who were pronounced as suffering from maxillary sinus infection by the radiologist, 20 showed an opacity of both antra, 6 of the left antrum alone, and 7 of the right antrum

FIG. 2.—(Case 21, Table 1): both antra opaque; no fluid dicovered on aspiration.

only. Of the 13 children who warranted a radiological examination of the lungs, 11 exhibited a varying degree of past or present infection, such as increased peri-bronchial shadows, calcified hilum nodes, or fibrosis of a base of a lung.

Treatment.—Of the 33 patients 22 were referred to the surgeon for operative treatment; the rest were either treated medically, or are awaiting an operation, or in 3 cases failed to return to the clinic at the stated time for further observation. The surgical treatment consisted of puncture, aspiration of the contents of the antra, and irrigation. Of all the cases so

treated 18 showed pus or serum in both or either maxillary sinuses, and in 4 cases no fluid was obtained. However, one of those 4 cases (No. 18) showed a marked improvement immediately after the irrigation, and within a week all signs of naso-respiratory catarrh disappeared.

Results.—Of the 22 patients treated surgically for chronic antrum infection 7 made an excellent recovery in the sense that all signs of catarrh rapidly subsided, the children have been free from colds since the operation, anorexia disappeared, and they have gained a great deal in weight. Four children made a good but less striking recovery, 7 showed a still lesser degree of improvement because of the persisting nasal obstruction and general

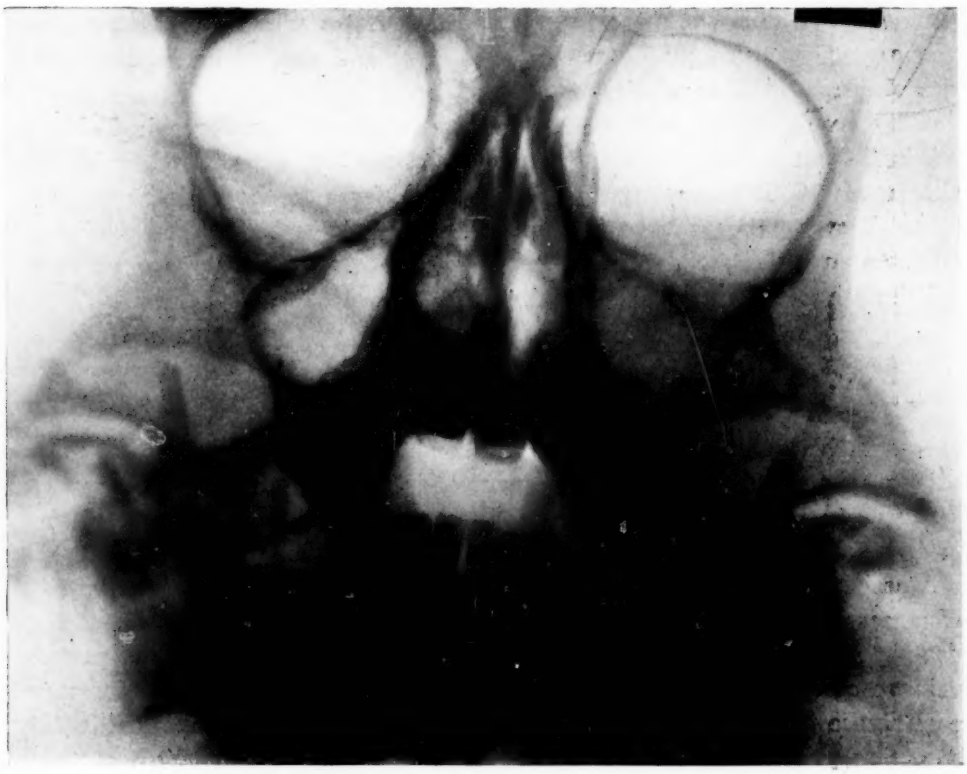

FIG. 3.—(Case 17, Table 2): antra pronounced as unaffected; pus aspirated from left antrum.

debility, and 2 patients (Cases No. 21 and No. 30), both suffering from pulmonary tuberculosis, showed no improvement whatsoever in spite of prolonged stay at a convalescent home. The present condition of 2 patients is unknown as they have failed to return to the clinic since the operation (Cases No. 31 and No. 12).

Of the remaining 11 cases, 3 are booked for operations, 3 have failed to return, and 5 have received medical treatment. One showed remarkable improvement, 3 profited temporarily, and one (Case No. 6) has not responded to treatment.

Table 2 dealing with 39 children whose skiagrams were negative for

antrum infection, requires little discussion, as the incidence of symptoms and signs is very similar to Table 1. Only clinical signs in the lungs are more frequent (39 per cent. as compared with 27·5 per cent. in Table 1), and fewer children had had their tonsils removed (66·6 per cent. in Table 2 as 75·7 per cent. in Table 1). The similarity of the clinical picture in spite of the negative findings of the radiologist, leaves little doubt in the mind of the writer that the majority of the children in this group also suffered from sinusitis. The reasons for this conclusion will be discussed below.

Thirty-six patients in Table 2 were treated on general medical lines and 3 were referred to the surgeon for exploration of the antra. One of these showed pus in the left antrum and made a fair recovery; another gave a negative puncture, but after irrigation of the antra made a rapid complete recovery. The third gave a negative puncture and showed no improvement with either surgical or medical treatment.

The results in Table 2 are far less satisfactory than those in Table 1 as it is difficult to obtain faithful observance of medical instructions, especially with such tedious treatment as here involved, from mothers of the hospital class. Eleven patients disappeared with results unknown. Of the remainder, 4 made an excellent recovery, 6 a good one, 8 showed a slight improvement, and the other 10 have not benefited at all.

Discussion.

While the series here studied is small the patients examined are well representative of the hospital class of children in London. The evidence indicates that sinusitis is a more frequent and important complication as well as cause of colds in London children than is generally assumed. It goes far towards contradicting the belief that climate and housing conditions as found in America are the chief causes of the disease; they may be contributory influences, but the most important factor is the structural peculiarity of the naso-pharynx which favours mouth-breathing and interferes with the proper drainage of the nasal passages and with effective aeration of the accessory nasal sinuses. A child with a high narrow hard palate, a superior dental protrusion, a small collapsed nose, small posterior nares, a deflected septum and hypertrophied turbinates, is likely to suffer from chronic sinusitis, especially if his general health is below normal.

Radiological diagnosis of sinusitis.

In Table 1 there are 4 cases which on aspiration showed no fluid in the antra. It must be remembered that to distinguish radiologically between the presence of fluid and granulations is impossible. Although no pus or serum was obtained the fault did not lie necessarily with the skiagrams, since the antra may have contained granulations or a markedly thickened membrane; or again the pus, if mucoid, may have been discharged in a single lump just before the operation, leaving the cavity clear. Cases No. 18

in Table 1 and No. 21 in Table 2 may be considered from the rapidity of their recovery as illustrating the foregoing conditions. On the other hand, there always remains the possibility, in rare instances, of a small thick-walled sinus producing an opacity on the screen where no infection is present.

With respect to negative skiagrams as presented in Table 2 the possibility of sinusitis must not be dismissed when all other signs and symptoms are indicative of it. A large deep thin-walled sinus may show a normal appearance and yet contain granulations or pus. Further, the hypertrophic form of sinusitis which often occurs in asthma and which is characterized by simultaneous effusion of serous fluid into several sinuses, may also be undetected radiologically because the rarification of the bone compensates the marked thickening of the mucosa. The author believes it safe to assume that many of the children in Table 2 would have shown serum or pus on exploration of the antra.

Conclusions.

1. It seems highly probable that many naso-respiratory infections in London children are due to sinusitis.

2. The possibility of sinusitis should be investigated in all cases of chronic nasal catarrh and frequent pulmonary infections, especially in children in whom tonsils and adenoids have been removed.

3. The chief causes of sinusitis are nasal obstruction, neglected colds and debility.

4. Skiagrams are an important diagnostic aid, but by no means infallible; the final diagnosis depends on correlation of clinical manifestations, radiological findings, and exploration of the sinuses.

The author wishes to express her thanks to Dr. Donald Paterson for allowing her facilities for this work, also to Mr. Charles Keogh and Mr. James Crookes for undertaking the surgical treatment of these cases.

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TUBERCULOUS LARYNGITIS IN CHILDREN

BY

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The occurrence of tuberculosis of the larynx in children is usually regarded as being extremely rare. This view may be due, in part, to the fact that the symptoms of this disease in children are seldom conspicuous, but probably it is also due in no small measure to the fact that an examination of the larynx of a child is not frequently made. My experience leads me to believe that this examination in a child is not usually difficult, and that where it is performed as a routine among children suffering from pulmonary tuberculosis it will be found that tuberculous laryngitis is not uncommon.

Symptoms.—The symptoms of this disease in children are seldom conspicuous—this has been a striking characteristic of most of the cases I have seen. Indeed, it is not uncommon for all symptoms to be absent and the disease to be only discovered in a routine examination of the larynx. The following case illustrates this:—

Case 1.—M. Y., female, aged 12 years. Admitted 15th September, 1931. In June, 1931, she had developed a cough. On admission she showed disease of both lungs, particularly right: sputum positive.

Laryngeal symtoms: none. Laryngeal examination: in May, 1932, showed inter-arytænoid deposit and some redness and swelling of arytænoids. The condition in September, 1932, still shows these lesions, but the child has no laryngeal symptoms.

More often, however, there is some loss of tone or huskiness of the voice. On questioning the child or even the parents it is not unusual to find that she or they are quite unaware of this huskiness, and even when they recognize its existence it is frequently impossible to obtain any reliable history as to its duration. Huskiness may be the only symptom. It may become more marked as the case progresses, but it does not usually progress to the stage of aphonia that characterizes this disease in its late stages in adults. That this huskiness may persist for long periods I have verified from the fact that I have had patients under my care in whom I have known it to be present for periods of from 1 to 4 years.

Dysphagia is so rare that it can hardly be characterized as a typical symptom as described in the text books. Very occasionally there may be a complaint of slight pain on swallowing but this is seldom sufficiently severe to require treatment, and may be only transitory. I have never met in a child the severe dysphagia that is seen in adults.

Similarly, apart from the cough due to the lung disease, the peculiar ineffectual cough described in books and noted in adults suffering from tuberculous laryngitis is seldom if ever observed in children.

Some pain or soreness of the throat may be complained of, but this is not of frequent occurrence and is usually slight and transitory.

Laryngeal lesions.—The most common lesion observed is a greyish heaped-up deposit in the inter-arytænoid region, with or without redness and swelling of the arytænoids (Case 1). The arytænoids only may be red and swollen in some early cases.

The false cords may be markedly swollen so as almost to obscure the vocal cords, and in addition a greyish deposit may be present on the inner aspect of the swelling. A typical example of this may be quoted.

Case 2.—L. C., female, aged 13 years. Admitted 20th October, 1931. Mother has pulmonary tuberculosis. Patient had measles, diphtheria and whooping cough in infancy. She caught a cold 2 months before admission and has had a cough since. She shows disease of left upper lobe, with positive sputum.

Laryngeal symptoms: huskiness for one week before last examination of larynx (September, 1932). Laryngeal lesion: marked swelling of false cords with rough greyish wash-leather deposit on inner aspect of swelling near the anterior commissure. Posterior ends of vocal cords visible.

There may be some swelling and pink or red discoloration of the vocal cords, and ulceration of the cords. An illustration of this is provided by the following case.

Case 3.—C. L., female, aged 15 years. Admitted May 5th, 1931, with a history of cough since Christmas, 1930, and hæmoptysis 3 weeks later. She showed disease of right lung and upper part of left: sputum positive.

Laryngeal symptoms: huskiness. Laryngeal examination: deposit in inter-arytænoid region. Pink discoloration of both cords. Swelling of right cord with ulceration at the posterior end.

Together with the ulceration, or as a result of it, there may be scarring and deformity of the cords with impaired movement.

In one case under my care some years ago, in which there was considerable lupus of the face, there was thickening and deformity of both cords with marked scarring and deformity of the epiglottis.

Incidence.—In the great majority of cases the disease occurs in children who have active pulmonary tuberculosis, and whose sputum contains tubercle bacilli. As this type of pulmonary tuberculosis occurs more often among older children, so tuberculous laryngitis is found more frequently among these older childhen. Usually the children are over 10 years of age, but the disease does occur under this age. The cases with the most extensive pulmonary disease are those most likely to be affected, but the disease may occur among those cases in which the lung signs are slight, and in whom tubercle bacilli have not been found in the sputum. All the cases I have seen have been secondary to lung disease. They have been largely among females, but this may be due to the higher incidence of pulmonary tuberculosis among girls. In a small series of cases (11) I published some

years ago I found the incidence was similar in the two sexes. In that series tuberculous laryngitis was present in 12·5 per cent. of those cases of pulmonary tuberculosis with tubercle bacilli in the sputum (9 cases among 72 children). In a recent series there were 13 cases among 48 children similarly affected (27 per cent.).

In the last series examined recently there were 14 cases among 64 children with positive sputa, approximately 22 per cent. The ages of the children examined were from 6 to 16 years, and the ages of the children affected 12 to 16 years.

Prognosis.—The ultimate prognosis of open cases of pulmonary tuberculosis in children, apart from any other fact, is notoriously bad so that it is difficult to say whether the development of tuberculous laryngitis affects it to any marked degree. That the disease may persist for long periods without apparently progressing to any marked extent is evident. I have observed patients for periods up to four years in whom only a slight increase in their symptoms and laryngeal lesions was observable at the end of these periods.

Where it is possible to benefit the pulmonary condition by active measures of treatment (e.g., artificial pneumothorax), or by ordinary routine treatment, one may reasonably expect a comparable improvement in the laryngeal condition. Certainly tuberculosis of the larynx is not a contra-indication for such therapeutic measures as artificial pneumothorax.